BLM LIBRARY
88046860

WILDLIFE RESOURCES
TECHNICAL REPORT
1988

For Amoco CO_2 Projects

Environmental Impact Statement

Prepared For:

U.S. Department of the Interior

Bureau of Land Management

Prepared By:

Planning Information Corporation

1801 Broadway, Suite 920

Denver, Colorado 80202

(303) 298-0919

TD
195
.P4
L3722
1988

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

ID88046860

TD
195
.P4
L3722
1988

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION 1
1.1 PURPOSE 1
1.2 OVERVIEW OF THE PROJECTS 1
1.3 SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT 1
1.4 DEFINITIONS FOR ANALYSES 1

CHAPTER TWO: AFFECTED ENVIRONMENT 4
2.1 INTRODUCTION 4
2.1.1 Habitats 4
2.1.1.1 Sagebrush/Grassland 4
2.1.1.2 Desert Shrub 4
2.1.1.3 Grassland 5
2.1.1.4 Mixed Shrub 5
2.1.1.5 Coniferous Woodland 5
2.1.1.6 Riparian 5
2.1.1.7 Cropland 6
2.1.1.8 Barren/Badlands 6
2.1.1.9 Disturbed 6
2.1.2 Wildlife 6
2.1.2.1 Big Game 6
2.1.2.2 Small and Medium Mammals 7
2.1.2.3 Upland Game Birds 7
2.1.2.4 Waterbirds 8
2.1.2.5 Raptors 8
Swainson's Hawk 8
Ferruginous Hawk 8
Golden Eagle 8
Red-tailed Hawk 8
Burrowing Owl 9
Great Horned Owl 9
American Kestrel 9
Northern Harrier 9
2.1.3 Aquatic Species 9
2.1.3.1 Aquatic Invertebrates 9
2.1.3.2 Salmonid Fishes 10
2.1.3.3 Non-salmonid Fishes 10
2.2 FONTENELLE CO_2 SUPPLY PROJECT 10
2.2.1 Big Game 11
2.2.2 Small and Medium Mammals 11
2.2.3 Upland Game Birds 11
2.2.4 Waterfowl 11
2.2.5 Raptors 11
2.2.6 Aquatic Species 13
2.3 ELK BASIN CO_2 PROJECT 13
2.3.1 Big Game 13
2.3.2 Small and Medium Mammals 17
2.3.3 Upland Game Birds 17
2.3.4 Raptors 17
2.3.5 Aquatic Species 17

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

2.4 BEAVER CREEK CO_2 PROJECT 21
2.4.1 Big Game 21
2.4.2 Small and Medium Mammals 21
2.4.3 Upland Game Birds 21
2.4.4 Raptors 21
2.4.5 Aquatic Species 24
2.5 LITTLE BUFFALO BASIN CO_2 PROJECT 24
2.5.1 Big Game 24
2.5.2 Small and Medium Mammals 24
2.5.3 Upland Game Birds 24
2.5.4 Raptors 27
2.5.5 Aquatic Species 27
2.6 SALT CREEK CO_2 PROJECT 27

CHAPTER THREE: ENVIRONMENTAL CONSEQUENCES 30
3.1 INTRODUCTION 30
3.1.1 General Consequences 30
3.1.1.1 Habitats 30
3.1.1.2 Big Game 30
3.1.1.3 Small and Medium Mammals 30
3.1.1.4 Upland Game Birds 30
3.1.1.5 Raptors 30
3.1.1.6 Aquatic Systems 30
3.1.1.7 Presence of Workers 31
3.1.2 Potential Impact Avoidance 31
3.1.2.1 Big Game 31
3.1.2.2 Small and Medium Mammals 32
3.1.2.3 Upland Game Birds 32
3.1.2.4 Raptors 32
3.1.2.5 Aquatic Systems 32
3.1.2.6 Presence of Workers 32
3.2 FONTENELLE CO_2 SUPPLY PROJECT 32
3.3 ELK BASIN CO_2 PROJECT 34
3.4 BEAVER CREEK CO_2 PROJECT 35
3.5 LITTLE BUFFALO BASIN CO_2 PROJECT 36
3.6 SALT CREEK CO_2 PROJECT 37

CHAPTER FOUR: THREATENED AND ENDANGERED SPECIES AND SPECIES OF SPECIAL CONCERN 38
4.1 LISTED AND PROPOSED SPECIES 38
4.1.1 Introduction 38
Bald Eagle 38
Peregrine Falcon 38
Whooping Crane 39
Black-footed Ferret 39
4.1.2 Fontenelle CO_2 Supply Project 39
4.1.3 Elk Basin CO_2 Project 40
4.1.4 Beaver Creek CO_2 Project 41
4.1.5 Little Buffalo Basin CO_2 Project 41
4.1.6 Salt Creek CO_2 Project 42
4.2 CANDIDATE SPECIES 42
4.2.1 Introduction 42
4.2.2 Species 42
White-faced Ibis 43
Swainson's Hawk 43
Ferruginous Hawk 43
Mountain Plover 43

Long-billed Curlew (Numenius americana) 44
Allen's Thirteen-lined Ground Squirrel
(Spermophilus tridecemlineatus alleni). 44
Wyoming Cave Snail (Physa spelunca) 44
4.2.3 Potential Effects 44

CHAPTER FIVE: REFERENCES 46

MAPS 48

Map 1 Fontenelle Project
Map 2 Elk Basin Project
Map 3 Elk Basin Project
Map 4 Elk Basin Trunk Pipeline
Map 5 Elk Basin Trunk Pipeline
Map 6 Beaver Creek Project
Map 7 Little Buffalo Basin Project
Map 8 Salt Creek Project

LIST OF FIGURES

Figure 1-1. Proposed Projects 2

Figure 2-1. Fontenelle CO_2 Supply Project 12

Figure 2-2. Elk Basin CO_2 Project 14

Figure 2-3. Beaver Creek CO_2 Project 22

Figure 2-4. Little Buffalo Basin CO_2 Project 25

Figure 2-5. Salt Creek CO_2 Project 28

LIST OF TABLES

Table 2-1. BLM Resource Areas Crossed by the Elk Basin CO_2 Project . . 15

Table 2-2. Big Game Herd Units and Hunt Areas of the Elk Basin CO_2 Project 15

Table 2-3. Crucial Winter Ranges--Elk Basin CO_2 Project 16

Table 2-4. Prairie Dog Concentrations--Elk Basin CO_2 Project 18

Table 2-5. Sage Grouse Leks--Elk Basin CO_2 Project 19

Table 2-6. Sage Grouse Nesting/Rearing Habitat--Elk Basin CO_2 Project . 20

Table 2-7. Raptor Nest Sites--Elk Basin CO_2 Project 20

Table 2-8. Wildlife Resources--Beaver Creek CO_2 Project 23

Table 2-9. Crucial Winter Range--Little Buffalo Basin CO_2 Project . . . 26

Table 2-10. Prairie Dog Concentrations--Little Buffalo Basin CO_2 Project 26

Table 2-11. Sage Grouse Leks--Little Buffalo Basin CO_2 Project 27

Table 2-12. Sage Grouse Nesting/Rearing Habitat--Little Buffalo Basin CO_2 Project 27

AMOCO CO_2 PROJECTS
WILDLIFE RESOURCES
TECHNICAL REPORT
CHAPTER ONE:
INTRODUCTION

1.1 PURPOSE

Amoco Production Company has proposed the development of five separate and distinct projects in the State of Wyoming. An Environmental Impact Statement (EIS) is being prepared to analyze the potential impacts associated with construction, operation, maintenance and abandonment of these five separate projects. This technical document was prepared to support the EIS analysis of potential impacts to wildlife of the Proposed Actions. Alternatives to the Proposed Actions are not discussed in this technical document.

1.2 OVERVIEW OF THE PROJECTS

Amoco proposes to pursue enhanced oil recovery, through the injection of CO_2, in four established fields: Elk Basin (Park County), Beaver Creek (Fremont County), Little Buffalo Basin (Park/Hot Springs Counties) and Salt Creek (Natrona County) (Figure 1-1). The CO_2 would be supplied by the Fontenelle Project (Lincoln/Sweetwater counties), which would obtain CO_2 from the nearby Raptor Unit and process it for transport. Pipelines (16 or 18 inch) would be constructed to deliver the CO_2 in conjunction with existing CO_2 pipelines, to the four fields. A plant to recycle injected CO_2 would be constructed in each of the four fields.

The Fontenelle CO_2 Supply Project would be constructed in 1989 and 1990. Construction of the Elk Basin CO_2 Project would occur in 1989, 1990 and 1991. The Beaver Creek CO_2 Project is proposed for 1991, 1992 and 1993. The Little Buffalo Basin CO_2 Project is proposed for 1992, 1993 and 1994. The Salt Creek CO_2 Project's proposed construction is scheduled for 1993 through 1997.

Details of each project and schedules are included in Chapter 2 of the EIS.

1.3 SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

The scope of the EIS is primarily restricted to analyzing the impacts associated with construction of CO_2 spur and trunk pipelines and the proposed gas processing and CO_2 recycle plants. Impacts related to wellfield-related activities are discussed, although precise plans and locations for wellfield-related activities are not available at this time. Analysis and mitigation of specific impacts associated with individual wellfield-related activities will be conducted through supplemental environmental analysis after preparation of field development plans.

1.4 DEFINITIONS FOR ANALYSES

Crucial habitat is defined as an area that is essential to the survival of any wildlife species sometime during its life cycle (BLM, 1985a). Crucial winter range is the most common limiting factor in big game herd size and condition in

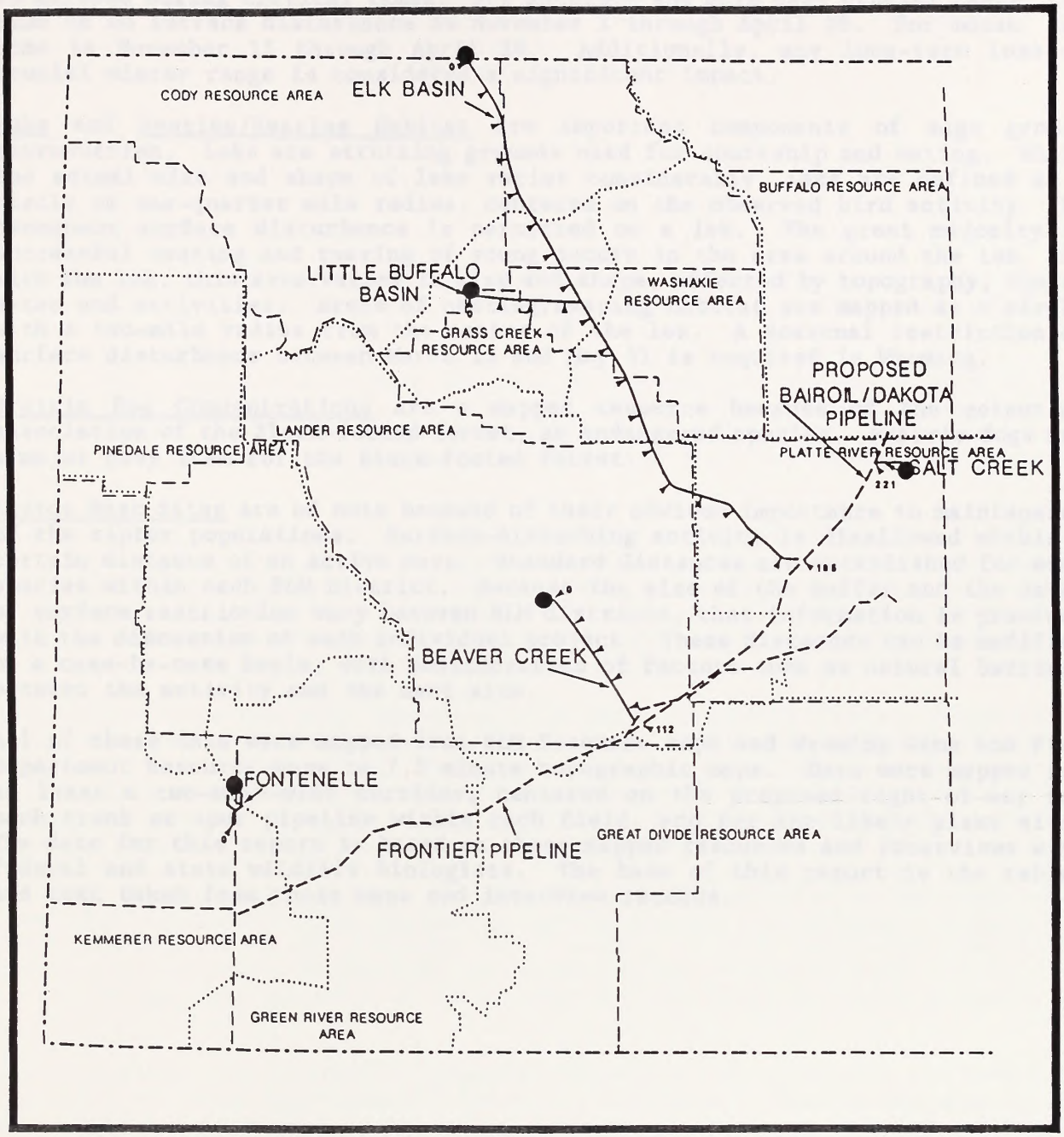


Figure 1—1. Location of Proposed Pipeline Alignments.

Wyoming. As such, these areas are mapped, and no surface-disturbing activity is allowed during critical times. For antelope and mule deer crucial range, the time of no surface disturbance is November 1 through April 30. For moose, the time is November 15 through April 30. Additionally, any long-term loss of crucial winter range is considered a significant impact.

Leks and Nesting/Rearing Habitat are important components of sage grouse reproduction. Leks are strutting grounds used for courtship and mating. While the actual size and shape of leks varies considerably, leks are defined as a circle of one-quarter mile radius, centered on the observed bird activity. No permanent surface disturbance is permitted on a lek. The great majority of successful nesting and rearing of young occurs in the area around the lek. As with the lek, this area varies in size and shape, affected by topography, cover, water and activities. Areas of nesting/rearing habitat are mapped as a circle with a two-mile radius from the center of the lek. A seasonal restriction on surface disturbance between March 15 and May 31 is required in Wyoming.

Prairie Dog Concentrations are a mapped resource because of the potential association of the Black-footed ferret, an endangered species. Prairie dogs are a major prey item for the Black-footed ferret.

Raptor Nest Sites are of note because of their obvious importance to maintenance of the raptor populations. Surface-disturbing activity is disallowed within a certain distance of an active nest. Standard distances are established for each species within each BLM District. Because the size of the buffer and the dates of surface restriction vary between BLM districts, that information is provided with the discussion of each individual project. These distances can be modified on a case-by-case basis, with consideration of factors such as natural barriers between the activity and the nest site.

All of these data were mapped from BLM Resource maps and Wyoming Game and Fish Department Resource maps to 7.5 minute topographic maps. Data were mapped for at least a two-mile-wide corridor, centered on the proposed right-of-way for each trunk or spur pipeline within each field, and for the likely plant site. The data for this report is based on those mapped resources and interviews with federal and state wildlife biologists. The base of this report is the tables and text taken from those maps and interview records.

AMOCO CO_2 PROJECTS
WILDLIFE RESOURCES
TECHNICAL REPORT
CHAPTER TWO:
AFFECTED ENVIRONMENT

2.1 INTRODUCTION

2.1.1 Habitats

An integral part of any discussion of wildlife is habitat. Several systems of habitat description have, and are, evolving; none has yet fully satisfied all users.

Within this report and in the EIS, habitat types will be those used in the Vegetation Technical Report. This allows reference to a complete, detailed and source-listed description existing within this EIS entity. The following vegetation types and descriptions are summarized from the Vegetation Technical Report.

The flora of the study area, which reflects the diversity of Wyoming itself, is a composite of several floristic elements, primarily the Rocky Mountain Element, the Great Plains/Prairie Element and the Great Basin Element. Vegetation zones of Wyoming are generally correlated with altitude although the demarcation between zones is not necessarily horizontal. The major vegetation zones of the study area are Foothills Scrub, Grassland, Desert and Basin and River Bottoms.

The project area has been mapped as nine major vegetation types: Sagebrush/ Grassland, Desert Shrub, Grassland, Mixed Shrub, Coniferous Woodland, Riparian, Cropland, Barren/Badlands and Disturbed. Current production (pounds per acre) within study area vegetation communities depends to a great extent on grazing management and the resulting range condition. Potential vegetation production depends primarily on soils, elevation and precipitation.

2.1.1.1 Sagebrush/Grassland. The project area is dominated by the Sagebrush/ Grassland vegetation type occupying gently rolling topography. Sagebrush/ Grassland vegetation can be found on a variety of soil types and topography. Within the community, composition varies with shrubs typically constituting from 40 to 70 percent, grasses 30 to 60 percent and forbs a trace to about 10 percent.

The vegetation type is usually dominated by Wyoming Big sagebrush, but Basin Big sagebrush and Black sagebrush sub-types are also found. Wyoming Big sage is the most widely distributed. Black sage-dominated areas are usually at higher elevations, often in the transition zone to mountain brush communities. Basin Big sage is frequently found in valley bottom communities and is, therefore, also included in the Riparian vegetation type. Many Basin Big sage communities have been converted to cropland.

Common grasses of the Sagebrush/Grassland type are Western wheatgrass, Thickspike wheatgrass, Indian ricegrass, Needle and thread, Green needlegrass, Bluebunch wheatgrass, Sandberg bluegrass, Idaho fescue and Threadleaf sedge.

2.1.1.2 Desert Shrub. The Desert Shrub type is a low stature, low density type characteristic of more alkaline soils. Total plant cover may average as little

as 10 percent. Gardner saltbush is the most common dominant, although Nuttall saltbush, Birdsfoot sage, Shadscale or Fourwing saltbush may be co-dominants or may dominate sub-types depending on soils, management and other factors. Shrubs may constitute as much as 90 percent of total cover, although the potential composition of Desert Shrub communities (e.g., saline upland, impervious clay or shale range sites) is about 40 to 50 percent grasses, 10 percent forbs and 40 to 50 percent shrubs.

Other common shrubs of the Desert Shrub vegetation type are Spiny hopsage, Spineless horsebrush, Bud sagebrush, Winterfat and Greasewood. Understory species include Bottlebrush squirreltail, Indian ricegrass, Thickspike wheatgrass, Needlegrass and Western wheatgrass.

2.1.1.3 Grassland. This primarily herbaceous type occurs on level to rolling topography. The dominant grass species include Bluebunch wheatgrass, Western wheatgrass, Indian ricegrass, Blue grama, Buffalo grass, Sideoat grama, Needlegrass, Sandberg bluegrass, June grass and Idaho fescue. Common forb species include Yarrow, Phlox, Buckwheat, Golden aster, Blazing star, Prickly pear cactus, Locoweed and Goldenrod. Overgrazed Grasslands often deteriorate to shrub-dominated communities or form a mosaic with the Sagebrush/Grassland types. Therefore, areas classified as Grassland may include areas dominated by sagebrush.

2.1.1.4 Mixed Shrub. The Mixed Shrub type includes a variety of shrub-dominated communities which are either so heterogenous that they cannot be categorized within the other types or are composed of an intricate mosaic of other types. Many of the shrubs of this type also occur as dominants or co-dominants of other types, including Big sagebrush, Shadscale, Gardner saltbush, Rubber rabbitbrush, Greasewood, Horsebrush and Spiny hopsage. Shrubs of this type which are not common constituents of other types are Skunkbrush sumac and Fringed sage.

The Mixed Shrub type is used primarily to delineate sparsely vegetated shrublands of moderate to steep slopes. Soils are generally thin and/or rocky. This type has not been used to denote dense, mixed shrub bottomlands. The latter have been classified as Riparian or Sagebrush/Grassland, as appropriate.

2.1.1.5 Coniferous Woodland. Tree density within a Coniferous Woodland may vary from a few scattered trees on rocky outcrops to true dominance by trees in large forests. Within the study area, Coniferous Woodlands are limited to scattered trees on moderate to steep slopes with shallow and rocky soils. The study area does not include any stands of harvestable timber. Overstory species include both Utah and Rocky Mountain Juniper, Limber pine and an occasional Pinyon pine. Common understory species are Big sagebrush, Rabbitbrush, Western wheatgrass, Bottlebrush squirreltail, Indian ricegrass, Bluebunch wheatgrass, Prairie junegrass and Needle and thread grass.

2.1.1.6 Riparian. The Riparian type occupies flat to gently sloping bottomlands in a variety of soil types. Whether the adjacent water body is perennial, intermittent or ephemeral, riparian vegetation is influenced by it during at least part of the growing season. The influence may be direct (e.g., by periodic flooding) or indirect (e.g., from a high water table such as in a subirrigated meadow or a Greasewood bosque). Despite their relatively homogenous topography, Riparian communities are characterized by both temporal and spacial variation in vegetation in response to changes in amount and quality of water. All or part of a riparian community may be wet with fresh or saline water for various portions of the growing season. Both wide and narrow riparian

areas are frequently characterized by bands or zones of different vegetation. Changes in available water which create much of this zonation may be influenced by slight changes in elevation, distance from the water body or the influence of soil texture (porosity) on available water.

The Riparian type includes tree-, shrub- and herbaceous-dominated communities. Common tree dominants include Cottonwood, Hawthorn, Russian olive, Water birch or Peachleaf willow. Shrub-dominated communities usually include a variety of genera and species including willows, tamarisk, dogwood, chokecherry, gooseberry, Big sagebrush, Rubber rabbitbrush or Greasewood. Graminoids may include many upland species from adjacent communities plus more water and/or salt tolerant species such as Inland saltgrass, Alkali cordgrass, Tufted hairgrass, Alkali sacaton, Basin wildrye, Baltic rush and various sedges. Forbs may be common but are not usually dominant.

2.1.1.7 Cropland. Cropland includes both irrigated and non-irrigated right-of-way and forage crops including managed pastures. Common crops of the study area include corn, sugar beets, alfalfa, wheat and native grass pasture. This type does not include open range grazing land even if it is privately owned.

The distinction between the Riparian type and Cropland is not always clear, particularly in bottomlands along the major rivers. For example, subirrigated native grass meadowland (an herbaceous Riparian type) is probably cut for hay or used to pasture livestock. While the types may be interchangeable in small areas, bottomland fields cut for hay are generally designated as Cropland, and grazed meadows and fields interspersed with willows or cottonwoods are generally mapped as Riparian.

2.1.1.8 Barren/Badlands. The Barren/Badlands designation is more properly a "landform" or "cover" type rather than a "vegetation" type, but it has traditionally been used to designate areas of extremely sparse vegetation and/or steep highly erodible terrain. This designation includes Soil Conservation Service soils delineated as "Badlands" or "Rock outcrop" unless another vegetation type, typically Coniferous Woodland or Desert Shrub, could reasonably be assigned to the area. Many badlands areas support a very sparse saltbrush community, but retention of the Barren/Badlands type serves to distinguish between productive Gardner Saltbush (Desert Shrub) communities on gentle to moderately sloping topography and the sparse, relatively unproductive communities of steep, erodible slopes.

2.1.1.9 Disturbed. Small areas of disturbance, e.g., roads, houses, corrals, utility lines, existing pipelines, etc., are included in all of the other designated vegetation types. Significant areas of manmade disturbance (e.g., industrial facilities and cities) are specifically delineated.

2.1.2 Wildlife

2.1.2.1 Big Game. Big game is a general term applied to larger mammals sought by hunters. The term has no real biological meaning, but is used in wildlife management. Wyoming is famous for its big game, with a recreation-based economy built around hunting.

As with most areas of the United States, much fluctuation in big game animal numbers and sizes has occurred over time; at least some of this is due to the influence of man. Evidence is well established for use of the animals by the Indian tribes of the area. Accounts of early European trappers and explorers

indicate at least some big game animals were not overly abundant in Wyoming in the 19th century (Wyoming Game and Fish Department, 1985). An overview of Wyoming mammalogy, more from a scientific perspective, is documented in Clark and Stromberg (1987).

Big game animals are a managed resource within the State of Wyoming. Herd Units are defined, with a corresponding geographical range. Any given Herd Unit has minimal interaction with an adjacent Herd Unit. The range of each Herd Unit is then evaluated in terms of habitat to allow management of both animal numbers and habitat composition and condition to develop maximum feasible or desirable herd sizes.

Big game animals, in terms of the Amoco CO_2 Projects, are the mule deer (Odocoileus hemionus) and the pronghorn antelope (Antilocapra americana).

There are 59 separate herds of mule deer in Wyoming. The animals seasonally occupy nearly 77,000 square miles of habitat, of which nearly 6,500 (8.4 percent) square miles are considered crucial (Wyoming Game and Fish Department, 1983). These numbers are close approximations. Among these crucial areas are fawning areas, migration corridors and winter areas.

Game management is a dynamic, ongoing process, with designations being modified as conditions change. The Wyoming Game and Fish Department's five-year plan contains targets of a 1988 harvest of 78,000 mule deer, with a hunter success rate of 50 percent. In terms of crucial habitat, an objective of maintaining a wintering population of 355,000 mule deer is included. Severe weather, deep snows and hunting are major factors limiting deer survival (Clark and Stromberg, 1987).

Wyoming has the largest population of pronghorn in North America. There are 54 separate herds of pronghorn antelope in Wyoming. The animals seasonally occupy 71,000 square miles of habitat, of which 5,100 square miles (7.2 percent) are crucial (Wyoming Game and Fish Department, 1983). The Department's five-year plan contains objectives for 1988 of a harvest of 64,000 antelope, with a hunter success rate of 89 percent. A wintering population of 239,000 animals is the desired goal.

2.1.2.2 Small and Medium Mammals. Many species of smaller mammals would be expected along the routes of the proposed projects. These would include rabbits, jackrabbits, ground squirrels, various mice, rats, voles, weasels and prairie dogs, among others. Of particular note are the prairie dogs. The endangered Black-footed ferret is associated with prairie dog groupings. A recent description and discussion of habitats for Wyoming's mammals is given in Clark and Stromberg (1987).

2.1.2.3 Upland Game Birds. Chief among the upland game birds is the sage grouse. Mourning dove would also be expected in some areas.

Of particular importance are the sage grouse reproductive areas. The birds use elevated, flat, open areas for mating displays. The grounds themselves are termed "leks." Birds often adopt old runways, little-used dirt road stretches and pipeline rights-of-way as leks, as the manmade modifications can create the desired characteristics. Wildlife managers define a lek as a circle of one-quarter mile radius. As a general case, most of the nesting and rearing of young occurs within a two-mile radius, centered on the center of the lek. This is a generalization, as topography, cover, water and food all influence nesting and rearing area use and density.

2.1.2.4 Waterbirds. Waterfowl distribution is severely limited in Wyoming due to habitat availability. The lack of abundant permanent water and high-quality cover restricts waterfowl to distinct areas; chief among these are the rivers and lakes/reservoirs, followed by stock ponds. Shorebirds, ducks, geese, cranes, herons, loons and grebes all utilize particular aquatic habitats.

2.1.2.5 Raptors. Several raptorial species are known to overwinter, utilize or nest in parts of the project's areas.

Swainson's Hawk (Buteo swainsoni)

Breeding: Widespread over much of the western half of the U. S., extending northwest into Southern Alaska, south into northern Mexico.

Winter: Very few are documented for the U. S., most migrate to South America.

Habits, Habitat: This species inhabits plains, prairies and open terrain, feeding on a variety of insects. Migration flocks are well-known, circling in "kettles" numbering dozens to hundreds of birds in rising thermals. Control or eradication of their primarily insect diet has resulted in reduced numbers.

Ferruginous Hawk (Buteo regalis)

Breeding: Interior western U. S., north to south-central Canada, in grassland to semi-arid plains.

Winter: Shifting south and west from northern California to Nebraska, Texas, into northern Mexico.

Habits, Habitat: Feeding mostly on mammals such as ground squirrels and rabbits, these birds soar and hover overhead or scan from posts, poles or even on the ground.

Golden Eagle (Aquila chrysaetos)

Breeding: Widespread in mountainous or hilly country through most of North America. Breeding across Canada and Alaska south through the western states into Mexico. A few pairs are found in the Appalachians.

Winter: The birds retreat from the Arctic and Boreal areas during the winter, but are year-round residents elsewhere.

Habits, Habitat: Being large raptors, the usual food consists of rabbits and other medium-sized mammals, as well as taking crippled waterfowl during the winter. During this time, eagles wander and migrate away from usual haunts.

Red-tailed Hawk (Buteo jamaicensis)

Breeding: Across North America from central Alaska to Labrador, south into Mexico, several well-marked races.

Winter: Primarily from the southern edge of Canada southward.

Habits, Habitat: Primarily a bird of open woodland or woodland edge, one race ("kriders") occurs on more open country of the plains, while the race "Harlan's" is found in heavily-wooded country from central Alaska into Pacific Northwest.

Red-tails feed primarily on rabbits, squirrels, gophers, as well as snakes, birds and amphibians.

Burrowing Owl (Athene canicularia)

Breeding: In desert and open grassland from southwestern and central Canada south, into Mexico; Central to South America. Also resident in southern Florida.

Winter: Southwestern U. S. and south.

Habits, Habitat: A diurnal owl often seen on posts, poles or on the ground near its burrow, often associated with prairie dog colonies. Primarily insect eaters, they vary their diet with occasional small mammals and birds.

Great Horned Owl (Bubo virginianus)

Breeding: Year-round resident through most of North America, breeding from the limit of the tree line south throughout the U. S. into Mexico and down into South America.

Habits, Habitat: Reflecting its diverse habitat and topographic forms, from high Arctic woodland to tundra edge through all types of deciduous and coniferous woodland, desert and urban areas. Its diet is equally diverse: skunks, opossums, squirrels, rats, ducks, hawks and other owls.

American Kestrel (Falco sparverius)

Breeding: Across North America to tree line at the north, throughout the U. S. into Mexico, south to South America.

Winter: Retreats south to southwestern Canada, down through mid-Plains, and New England, then southward.

Habits, Habitat: Kestrels utilize open woodland, plains, farmland and suburbs. The diet consists primarily of insects, varied by occasional small rodents, reptiles and small birds. They are numerous, adaptable and frequently seen. Formerly known as Sparrow Hawk.

Northern Harrier (Circus cyaneus)

Breeding: Across North America from Central Alaska and Newfoundland south to Southern California and the mid-Atlantic States.

Winter: Ranges from western British Columbia, central Plains and New England southward, down into northern South America.

Habits, Habitat: Prefers marshlands, grasslands and prairies. Feeds on a variety of small mammals. Formerly called Marsh Hawk.

2.1.3 Aquatic Species

2.1.3.1 Aquatic Invertebrates. Aquatic invertebrates inhabit the sediment surface of all streams, especially in areas of hard substrate. Insect species dominate the benthos, particularly larval forms. Intermittent and ephemeral streams are utilized when water is present by species with short life cycles.

Common groups include the mayflies, chironomid flies, black flies and caddisflies. Non-insectan benthos include amphipods, oligochaetes and mollusks.

2.1.3.2 Salmonid Fishes. Basic information on fishes found in the project areas is discussed in Baxter and Simon (1970), Calhoun (1966), Carlander (1969) and Sigler and Miller (1963). The various trouts are the most popular sport fishes in Wyoming streams.

Rainbow trout (Salmo gairdneri) is one of the most sought after fishes throughout the west. Rainbow trout are spring spawners, spawning generally in April and May in Wyoming (Baxter and Simon, 1970). The Wyoming Game and Fish Department stocks the McConaughy strain of rainbow trout in various waterways in the projects' areas.

Brown trout (Salmo trutta) are an important sport species, considered by many fishermen to be one of the more difficult trouts to catch. Brown trout are fall spawners, spawning generally in October and November. Eggs remain in the gravel for three to five months before hatching, and the young remain in the gravel for one to two months (Staley, 1966).

Brook trout (Salvelinus fontinalis) are less common than the other trouts along the routes of the proposed projects. Brook trout spawn in the fall. Eggs hatch in three to four months, with the fry remaining in the sediment for another month.

The Wyoming Game and Fish Department has rated the waterways of Wyoming in terms of relative value as a trout fishery. Their classification system is as follows:

Class 1: Premium trout waters--fisheries of national importance.

Class 2: Very good trout waters--fisheries of statewide importance.

Class 3: Important trout waters--fisheries of regional importance.

Class 4: Low production trout waters--fisheries frequently of local importance, but generally incapable of sustaining substantial fishing pressure.

Class 5: Very low production waters--often incapable of sustaining a trout fishery.

A Water Resources Technical Report has been prepared for the Amoco CO_2 Projects. Discussions of potential water quality impacts, subjects which can affect fisheries, appear in this Water Resources Technical Report.

2.1.3.3 Non-salmonid Fishes. One other game fish is stocked in some of the waterways of the projects' areas. The smallmouth bass (Micropterus dolomieui) has been stocked by the Wyoming Game and Fish Department. Non-game fishes (minnows, suckers and other species) occur throughout the state's streams and rivers.

2.2 FONTENELLE CO_2 SUPPLY PROJECT

The Fontenelle CO_2 Supply Project would originate at the Raptor Field which surrounds Fontenelle Reservoir. One portion of the gas gathering system would

run from the west side of Fontenelle Reservoir south approximately 15 miles to the proposed Fontenelle Gas Processing Plant. A second portion, from the eastern area of the Raptor Field, would run south and then west, cross the Green River, and join the first pipeline (Figure 2-1).

Fontenelle Reservoir and the Green River separate the BLM Kemmerer and Green River Resource Areas.

2.2.1 Big Game

Mule deer in the project area are split into two Hunt Areas, West Green River (137) in the Wyoming Range Herd Unit, and Boulder (138) in the Sublette Herd Unit. Antelope Hunt areas are also split along the Green River, with Hunt Area 93 (West Green River) and Hunt Area 96 (West Farson). Crucial deer and antelope winter range is designated from approximately milepost 2W to the Raptor Field, the beginning of the Fontenelle Gas Gathering System (Map 1).

Crucial moose winter range (Map 1) is designated along a corridor approximately one mile wide, centering on the Green River. The proposed gas pipeline would cross this crucial range between approximately mileposts 10 and 11.

2.2.2 Small and Medium Mammals

One prairie dog concentration is mapped in the area, near milepost 3, approximately 1.7 miles from the right-of-way (Map 1). Sightings of Black-footed ferrets around Seedskadee Wildlife Refuge south of the project area have been reported in the past.

2.2.3 Upland Game Birds

One sage grouse lek has been mapped, near milepost 1 (Map 1). The border of the lek is approximately one mile from the right-of-way. Part of the proposed Fontenelle CO_2 Supply Plant site and the right-of-way to milepost 2 are within the technical limits of the two-mile radius circle of the nesting/rearing area. This portion of that technically defined area adjoins the large existing Exxon Shute Creek Gas Processing Plant.

2.2.4 Waterfowl

Various waterfowl species utilize the Green River. Seedskadee Wildlife Refuge is one mile downstream of the proposed pipeline crossing.

An area along Fontenelle Creek has been designated of importance to the Whooping crane (Map 1). Seasonal restrictions (April 1 to October 15) have been placed on surface disturbance in this area. The area's closest boundary lies over 1.5 miles from the Raptor Field, on the west side of Fontenelle Reservoir.

2.2.5 Raptors

Relatively few raptor nests are reported within the area of the project. Two Golden eagle nest locations, near mileposts 9 and 13, a Red-tailed hawk nest near milepost 13, and a Kestrel nest near milepost 11 all occur next to the

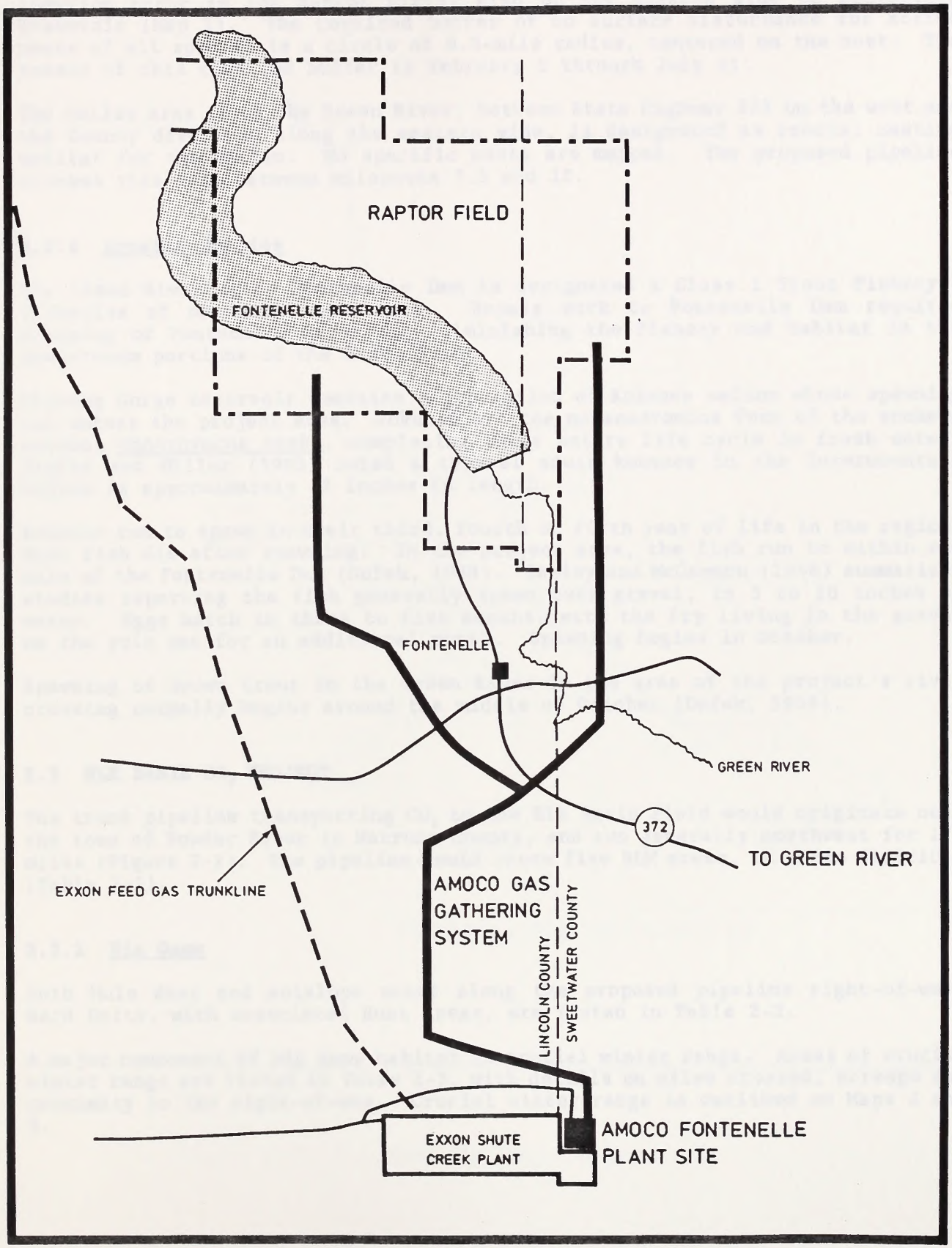


Figure 2—1. Proposed Fontenelle Project.

Green River. Two Ferruginous hawk nest locations and one Golden eagle nest location occur in the Raptor Field, also on the eastern side of Fontenelle Reservoir (Map 1). The required buffer of no surface disturbance for active nests of all species is a circle of 0.3-mile radius, centered on the nest. The season of this required buffer is February 1 through July 31.

The entire area along the Green River, between State Highway 372 on the west and the County dirt road along the eastern side, is designated as crucial nesting habitat for the Merlin. No specific nests are mapped. The proposed pipeline crosses this area between mileposts 7.5 and 12.

2.2.6 Aquatic Species

The Green River below Fontenelle Dam is designated a Class 1 Trout Fishery--fisheries of national importance. Repair work to Fontenelle Dam required draining of Fontenelle Reservoir, diminishing the fishery and habitat in the downstream portions of the Green River.

Flaming Gorge Reservoir contains a population of Kokanee salmon whose spawning run enters the project area. Kokanee are the nonanadromous form of the sockeye salmon, Oncorhyncus nerka, completing their entire life cycle in fresh water. Sigler and Miller (1963) noted a typical adult kokanee in the Intermountain Region is approximately 12 inches in length.

Kokanee run to spawn in their third, fourth or fifth year of life in the region. Most fish die after spawning. In the project area, the fish run to within one mile of the Fontenelle Dam (Dufek, 1988). Seeley and McCammon (1966) summarized studies reporting the fish generally spawn over gravel, in 3 to 10 inches of water. Eggs hatch in three to five months, with the fry living in the gravel on the yolk sac for an additional month. Spawning begins in October.

Spawning of brown trout in the Green River in the area of the project's river crossing normally begins around the middle of October (Dufek, 1988).

2.3 ELK BASIN CO_2 PROJECT

The trunk pipeline transporting CO_2 to the Elk Basin Field would originate near the town of Powder River in Natrona County, and run generally northwest for 178 miles (Figure 2-2). The pipeline would cross five BLM areas, in three districts (Table 2-1).

2.3.1 Big Game

Both Mule deer and antelope occur along the proposed pipeline right-of-way. Herd Units, with associated Hunt Areas, are listed in Table 2-2.

A major component of big game habitat is crucial winter range. Areas of crucial winter range are listed in Table 2-3, with details on miles crossed, acreage and proximity to the right-of-way. Crucial winter range is outlined on Maps 2 and 3.

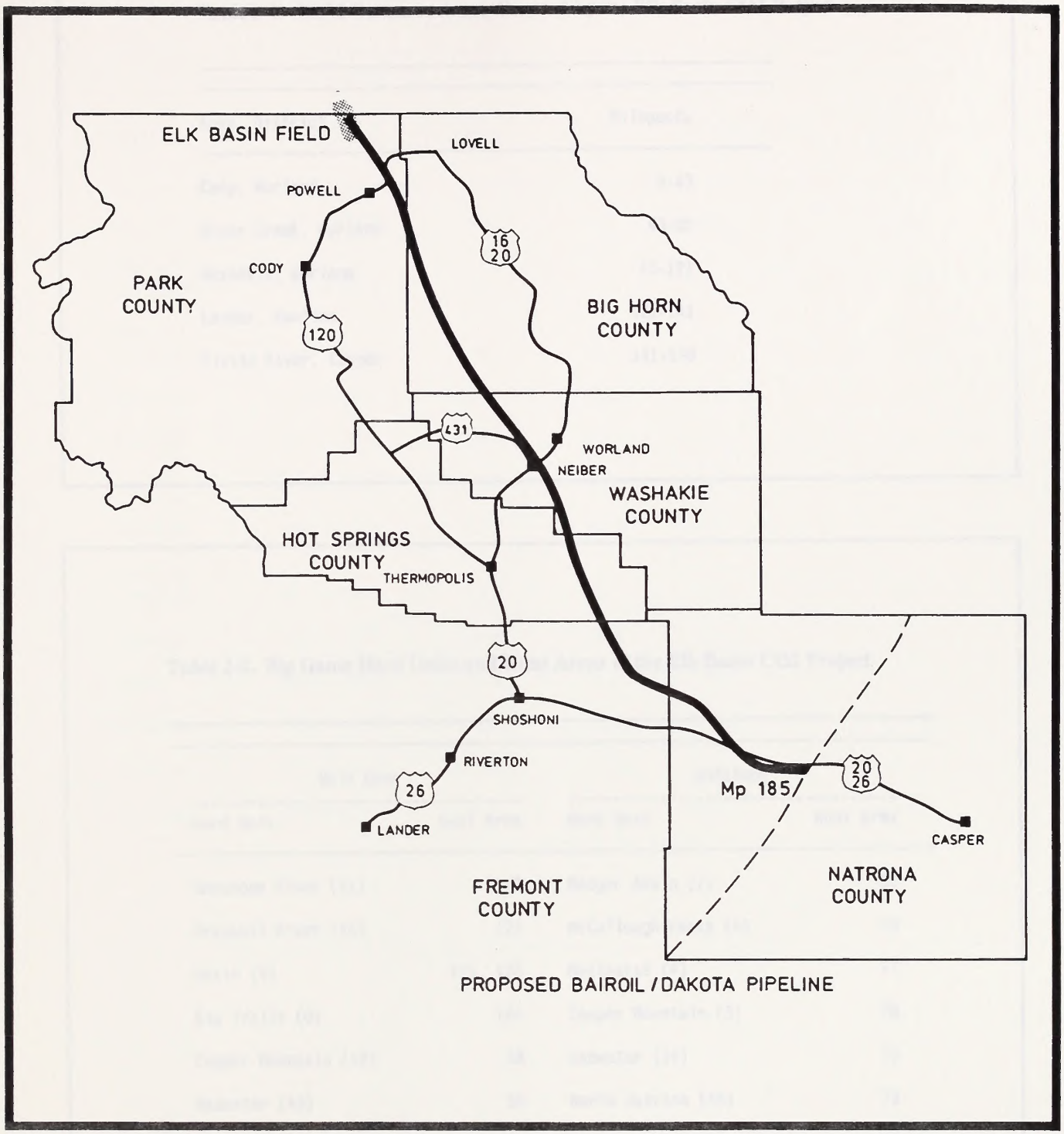


Figure 2—2. Proposed Elk Basin Project.

Table 2-1. BLM Resource Areas Crossed by the Elk Basin CO2 Project.

Area, District	Mileposts
Cody, Worland	0-43
Grass Creek, Worland	43-86
Washakie, Worland	86-121
Lander, Rawlins	121-141
Platte River, Casper	141-178

Table 2-2. Big Game Herd Units and Hunt Areas of the Elk Basin CO2 Project

Mule Deer		Antelope	
Herd Unit	Hunt Area	Herd Unit	Hunt Area
Shoshone River (11)	122	Badger Basin (7)	80
Greybull River (10)	124	McCullough Peaks (6)	78
Basin (9)	125, 126	Meeteetse (4)	77
Big Trails (8)	164	Copper Mountain (3)	76
Copper Mountain (18)	38	Badwater (34)	75
Badwater (49)	36	North Natrona (46)	73
North Natrona (59)	34	Rattlesnake (45)	72
Rattlesnake (58)	89		

Table 2-3. Crucial Winter Ranges--Elk Basin CO2 Project.

Species	Milepost	Miles	Acres	On Right-of-Way	Distance From Row (Miles)
Deer	54.0-55.2	----	----	No	1.1
Deer and Antelope	66.0-69.0	----	----	No	0.4
Deer and Antelope	69.0-73.1	4.1	37.3	Yes	----
Antelope	80.2-85.4	5.2	47.3	Yes	----
Antelope	85.0-100.0	15.0	136.0	Yes	----
Deer	102.4-108.4	6.2	56.4	Yes	----
Antelope	108.4-117.4	9.0	81.8	Yes	----
Deer and Antelope	121.2-134.1	7.0	63.7	Yes	----
Antelope	134.2-143.1	8.9	80.9	Yes	----
Deer	135.0-136.0	1.0	9.1	Yes	----
Antelope	146.8-147.8	1.0	9.1	Yes	----
Antelope	155.1-155.9	0.8	7.3	Yes	----
Antelope	174.8-177.0	----	----	No	0.1-0.7

2.3.2 Small and Medium Mammals

Two species are notable along the Elk Basin CO_2 Project Pipeline. The Thirteen-lined-ground-squirrel, Spermophilus tridecemlineatus, occurs throughout most of the central United States. Four Wyoming subspecies are recognized. One of these, S. tridecemlineatus alleni, occurs in the Big Horn Basin. The Wyoming Heritage Program lists the animal as a species of concern. Clark and Stromberg (1987) reported this subspecies is rare, if not extirpated, because of widespread distribution of poison grain by humans.

Location of prairie dog concentrations is considered important because of the association with the endangered Black-footed Ferret. Prairie dog locations along the Elk Basin CO_2 Project are listed in Table 2-4, with details on miles crossed, acreage and proximity to the right-of-way.

2.3.3 Upland Game Birds

Fifteen sage grouse leks were mapped along the proposed route. Location, proximity to the right-of-way and notes on activity are given in Table 2-5. Four areas of sage grouse nesting/rearing habitat, centered around the leks, are intersected by the right-of-way. These are located and detailed in Table 2-6.

2.3.4 Raptors

Reported nest sites of eight raptorial species occur along the Elk Basin CO_2 Project. Any nest may be utilized in any year, in some years or may have been abandoned. Each BLM Resource Area has established a buffer around each species' nest that prohibits surface disturbance during nesting, and up through fledging of the young. Dates of no surface disturbance are also determined by each BLM Resource Area. Those restrictions are guidelines; other factors, such as line-of-sight shielding by topography, can allow their modification. A listing of the raptor nests encountered with details on standard buffer areas and times of year is given in Table 2-7.

2.3.5 Aquatic Species

Twelve perennial streams are crossed by the proposed Elk Basin CO_2 Trunk Pipeline. Fisheries of the streams were discussed with Ron Kent, Steve Yekel and Kerry Connel of the Wyoming Game and Fish Department.

Bitter Creek (Class 3) contains brown trout and some rainbow trout. The Sidon Canal crosses Bitter Creek, causing a five-foot elevation drop, preventing spawning rainbow trout from running further upstream.

The Shoshone River (Class 3) has brown trout, whitefish and rainbow trout. The Game and Fish Department has been stocking the McConaughy strain of rainbow trout in the Shoshone River over the last 15 years. This is a migrating strain of rainbow trout. In spring, the fish's spawning run goes to Penrose Dam, just above the proposed pipeline crossing.

The Greybull River (Class 4) experiences dewatering in the area. It contains whitefish and brown trout.

Table 2-4. Prairie Dog Concentrations--Elk Basin CO2 Project.

Milepost	Acres	On Right-of-Way	Distance From Row (Miles)
1.7-1.8	----	No	1.8
2.2-3.8	----	No	0.3
26.5-28.0	----	No	0.1
39.5-40.2	----	No	0.5
39.6-40.1	4.5	Yes	----
66.1-66.6	4.5	Yes	----
67.6-68.6	9.1	Yes	----
73.0-73.4	----	No	0.4
73.5-75.0	----	No	0.6-1.0
75.7-76.2	----	No	0.3-0.5
76.5-77.0	----	No	1.6
77.0-78.0	----	No	1.0
124.1-124.2	----	No	0.5
131.4-132.1	6.4	Yes	----
136.2	----	No	1.8
137.6	----	No	1.7
137.5-139.0	----	No	0.1-0.5

Table 2-5. Sage Grouse Leks--Elk Basin CO2 Project.

Lek	Milepost	Distance From Right-of-Way (Miles)	On Right-of-Way	Active in 1987	Last Known Activity
1	0	1.1	No	Yes	1987
2	1	0.3	No	No	1968
3	1	2.7	No	Yes	1987
4	2	2.5	No	Yes	1987
5	2	2.7	No	Yes	1987
6	5	1.5	No	No	1967
7	5	0	Yes	Yes	1987
8	6	0.3	No	No	1974
9	7	0	Yes	No	1972
10	32	0.1	No	Unknown	1982
11	32	0.3	No	Unknown	1982
12	37	1.1	No	Unknown	1982
13	39	0.2	No	Unknown	Unknown
14	123	0.6	No	Unknown	Unknown
15	125	0.3	No	Unknown	1985
16	141	0.4	No	Unknown	Unknown

Supplementary Notes

1. Checked in 1987. Partial count, 2-10 males.
2. Checked in 1986 and 1987. No activity.
3. Checked in 1987. Partial count, 40+ birds.
4. Reported as active in 1987.
5. Checked in 1987. Partial count, 10 males.
6. Checked in 1986 and 1987.
7. Found in 1987. Partial count, 3 males. Located just east of the CIG road, near aerial marker 5.
8. Checked in 1986 and 1987.
9. Checked in 1987.
10. Last active 1982, not checked recently.
11. Last active 1982, not checked recently.
12. Last active 1982, not checked recently.
13. No data.
14. Recent usage:

1985	20 males
1984	25
1983	20
1982	15
1981	20
1980	15

15. Location from Wyoming Game and Fish Department records. Checked in 1983; no activity.

Table 2-6. Sage Grouse Nesting/Rearing Habitat-Elk Basin CO2 Project.

Milepost	Miles	Acres	On Right-of-Way	Distance From Right-of-Way (Miles)
0-9.4	9.4	85.4	Yes	___
29.8-34.2	4.4	40.0	Yes	___
35.6-41.4	5.8	52.7	Yes	___
121.0-127.0	6.0	54.6	Yes	___

Table 2-7. Raptor Nest Sites--Elk Basin CO2 Project.

Species	Approximate Milepost	Dates of No Surface Disturbance	Radius of Area (Miles)	On Right-of-Way
Great Horned Owl	28	Feb 1-June 1	0.6	Yes
Swainsons Hawk	29	Feb 1-July 1	0.6	No
Northern Harrier	30	Feb 1-July 1	0.6	No
Kestrel	32	Feb 1-July 1	0.3	Yes
Golden Eagle	33,40	Feb 1-July 1	0.6	Yes
Burrowing Owl	40	Feb 1-July 1	0.6	Yes
Ferruginous Hawk (2)	62,63	Feb 1-July 31	1.2	Yes
Golden Eagle (3)	89,98,99	Feb 1-July 31	0.6	No
Red-tailed Hawk (7)	103,104 106,107 109,115 118	Feb 1-July 31	0.3	No
Red-tailed Hawk	114	Feb 1-July 31	0.3	Yes
Ferruginous Hawk	118,122 124	Feb 1-July 31	1.2	Yes
Golden Eagle	135	Feb 1-July 31	0.6	No
Northern Harrier	145	Apr 1-July 15	0.5	No
Red-tailed Hawk	145,157	Apr 1-July 15	0.3	No
Ferruginous Hawk (5)	159,160 161,162	Mar 15-July 15	1.2	Yes
Golden Eagle	147,160	Feb 1-July 15	0.6	No
Ferruginous Hawk (3)	164	Mar 15-July 15	1.2	No
Golden Eagle	163,168	Feb 1-July 15	0.6	No
Ferruginous Hawk (2)	169,172	Mar 15-July 15	1.2	Yes

Few data are available on Willow Creek (Class 5); it is not likely to have a fishery of any consequence.

The Bighorn River (Class 4) contains brown trout and rainbow trout. Smallmouth bass were planted below upper Hanover Dam to Neiber. The river's fishery is rated lower in the area of the proposed crossing than it is in the upstream reach. The Bighorn River is affected by irrigation demands.

Kirby Creek (Class 4) contains some brook trout, a fall spawner (mid-October to December), as does West Bridger Creek (Class 4). No spawning activity occurs in West Kirby Creek (Class 4) or in Bridger Creek (Class 4) in the vicinity of the proposed crossings.

2.4 BEAVER CREEK CO_2 PROJECT

The trunk pipeline to transport CO_2 to the Beaver Creek Field originates near milepost 112 of the existing Bairoil-Dakota CO_2 pipeline. It runs northwest 44 miles to the Beaver Creek Field (Figure 2-3). The project is within the BLM Lander Resource Area.

2.4.1 Big Game

Both mule deer and antelope occur along the proposed pipeline right-of-way. The pipeline right-of-way begins in the Green Mountain Herd Unit designation and crosses into the Beaver Rim Herd Unit designation. Antelope along the proposed right-of-way are included in the Split Rock, Long Creek and Sand Draw Hunt Areas. Crucial winter range, sometimes overlapping, is listed in Table 2-8, with miles crossed, acreage and relationship to the proposed pipeline. Crucial winter range is outlined on Map 4.

2.4.2 Small and Medium Mammals

The animal of particular interest is the Prairie dog because of the association with the endangered Black-footed ferret. Prairie dog concentrations are noted on Table 2-8 and Map 4.

2.4.3 Upland Game Birds

Two sage grouse leks are mapped along the proposed right-of-way (Map 4); information on nesting/rearing areas is tabulated in Table 2-8. The right-of-way crosses 31.8 acres of sage grouse nesting/rearing habitat.

2.4.4 Raptors

Three raptor nest sites were recorded along the proposed right-of-way (Map 4). A Burrowing owl site in a Prairie dog colony was nearest milepost 3. It has an assigned buffer zone of no surface disturbance between February 1 and July 31. Its buffer zone is a circular area of 0.6 mile, centered on the nest site. The closest edge of the buffer zone is 1.1 miles from the edge of the right-of-way at its closest point. A Golden eagle nest site was recorded near milepost 6. Distance and data parameters for the buffer zone are identical to those listed

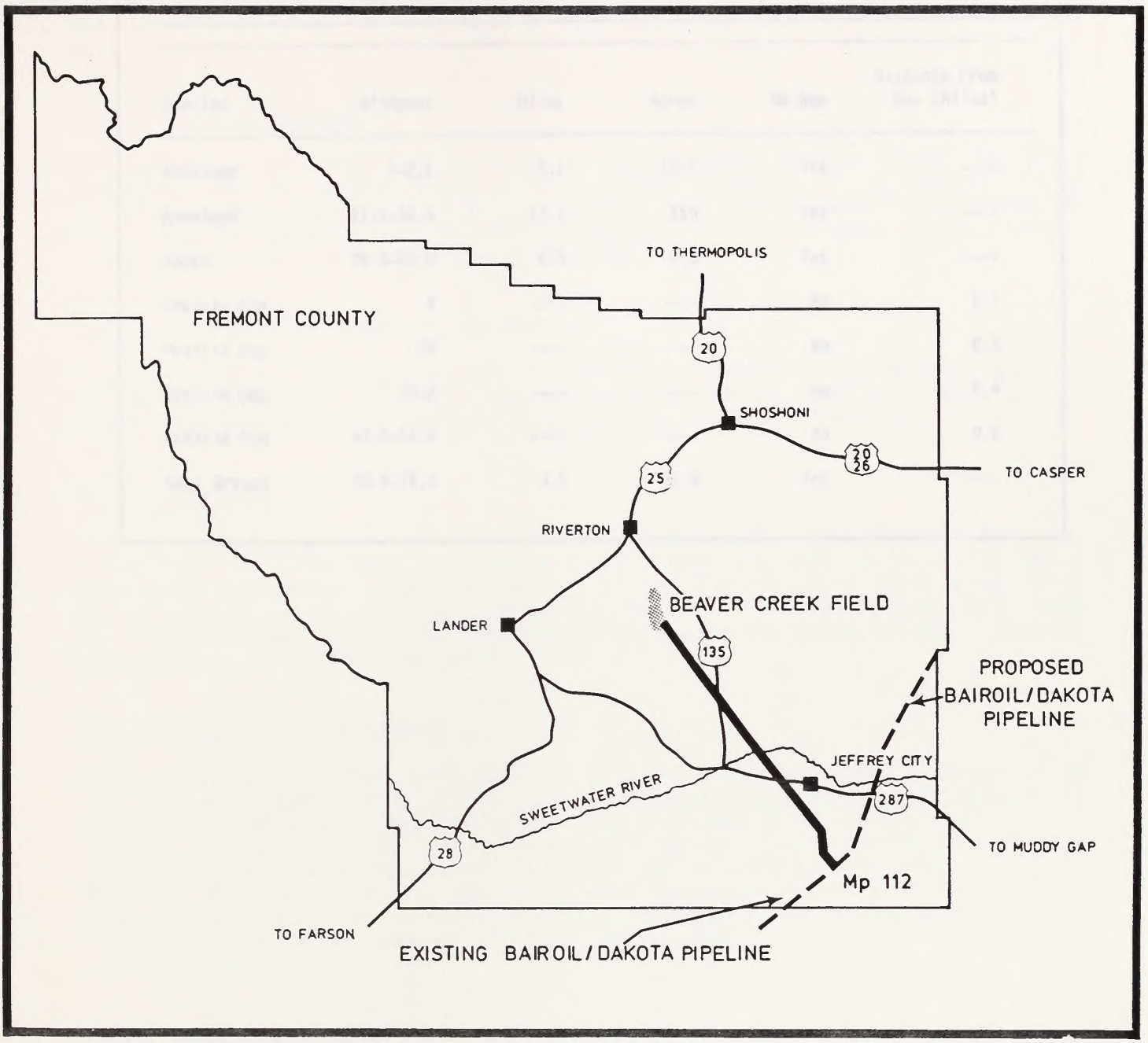


Figure 2—3. Proposed Beaver Creek Project.

Table 2-8. Wildlife Resources--Beaver Creek CO2 Project.

Species	Milepost	Miles	Acres	On Row	Distance From Row (Miles)
Antelope	0-2.1	2.1	19.1	Yes	----
Antelope	21.5-38.6	17.1	155	Yes	----
Moose	24.5-25.0	0.5	4.5	Yes	----
Prairie Dog	3	----	----	No	1.1
Prairie Dog	29	----	----	No	0.3
Prairie Dog	30.2	----	----	No	0.4
Prairie Dog	43.8-44.4	----	----	No	0.2
Sage Grouse	30.8-34.3	3.5	31.8	Yes	----

for the Burrowing owl. The edge of the buffer zone and the edge of the proposed right-of-way are a minimum of 1.7 miles apart. The third nesting site is of a Prairie falcon, near milepost 39. The buffer zone parameters are as above, with the nearest distance between buffer zone and right-of-way approximately 0.6 mile.

2.4.5 Aquatic Species

Two perennial waterways are crossed by the proposed Beaver Creek CO_2 Trunk Pipeline. The Sweetwater River is crossed near milepost 25, and Crooks Creek is crossed near milepost 41. Both streams have a trout fishery classification of 3. The Sweetwater River has some brown trout in this vicinity (Dufek, 1988). Crooks Creek contains brook trout (BLM, 1985).

2.5 LITTLE BUFFALO BASIN CO_2 PROJECT

The spur pipeline to transport CO_2 to the Little Buffalo Basin Field originates at the Elk Basin CO_2 Project Pipeline north of Neiber, and runs west for 35 miles (Figure 2-4). The project is within the BLM Grass Creek Resource Area.

2.5.1 Big Game

Both mule deer and antelope occur along the proposed right-of-way. Two Hunt Areas (125, 126) for mule deer are crossed; these are both parts of the Basin Mule Deer Herd Unit. Antelope belong to the Fifteen-Mile Creek Area (77). Crucial winter range, sometimes occurring jointly, is listed in Table 2-9, with details on miles crossed, acreage and proximity to the right-of-way. Crucial winter range is outlined on Map 5.

2.5.2 Small and Medium Mammals

Two species are of note along this project. The Big Horn Basin subspecies of the Thirteen-lined ground squirrel (Spermophilus tridecemlineatus alleni) is listed as a Category 2 species by the U.S. Fish and Wildlife Service and as a species of concern by the Wyoming Heritage Program. Locations of Prairie dogs are of note because of the association with the endangered Black-footed ferret. The only known population of ferrets is near Meeteetse, near the Little Buffalo Basin Field. Locations of Prairie dog concentrations are listed in Table 2-10, with details of miles crossed, acreage, and proximity to the right-of-way, and are mapped on Map 5.

2.5.3 Upland Game Birds

Eleven Sage grouse leks were mapped within the two-mile corridor containing the right-of-way (Map 5). Locations, with activity information, are given in Table 2-11. Nesting/rearing habitat surrounding the leks is also described in Table 2-12. Approximately 175 acres of nesting/rearing habitat would be crossed by the right-of-way.

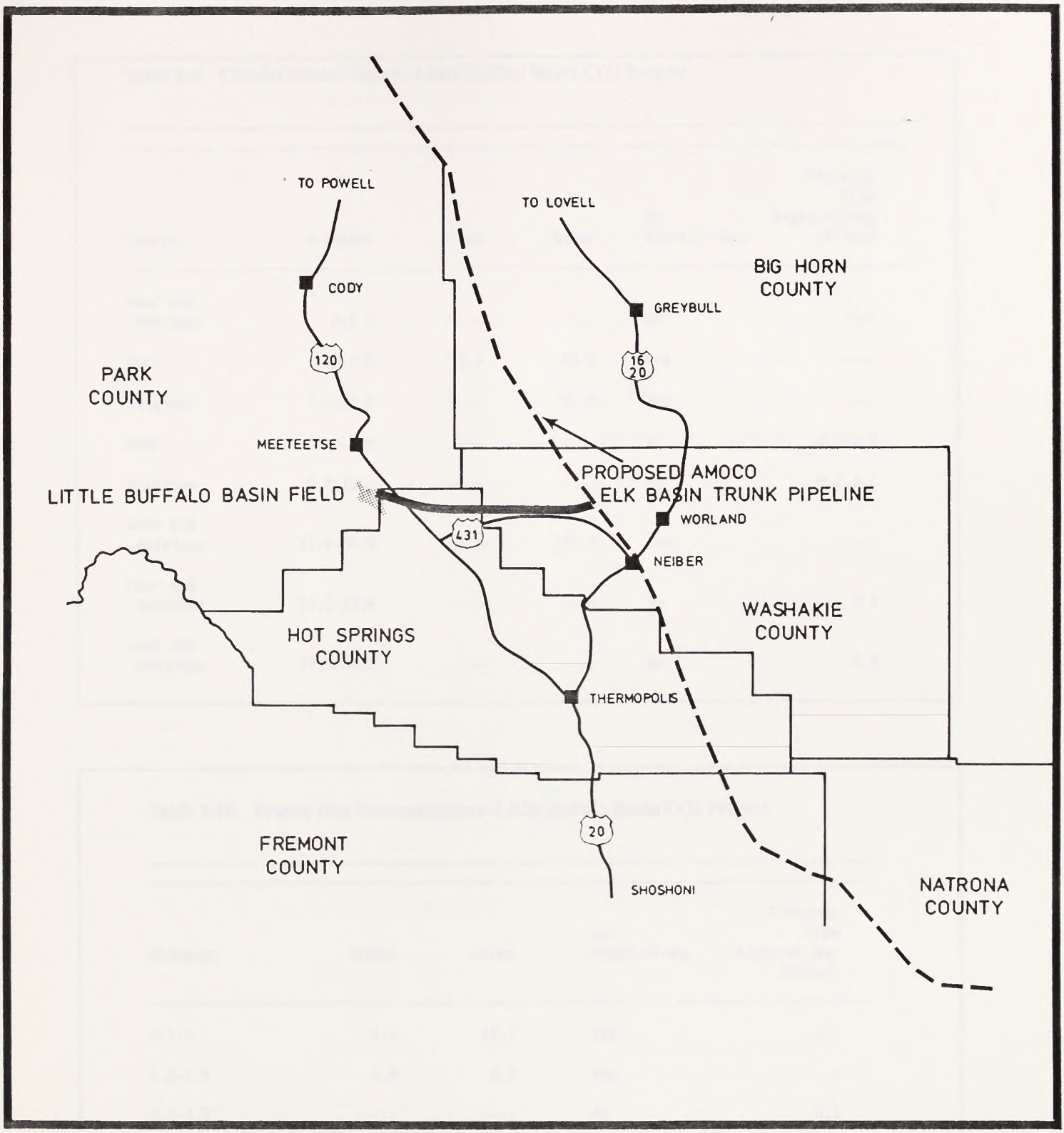


Figure 2—4. Proposed Little Buffalo Basin Project.

Table 2-9. Crucial Winter Range--Little Buffalo Basin CO2 Project.

Species	Milepost	Miles	Acres	On Right-of-Way	Distance From Right-of-Way (Miles)
Deer and Antelope	0-2.0	----	----	No	0.7
Deer	2.0-7.0	5.0	45.5	Yes	----
Antelope	3.6-12.6	----	81.9	Yes	----
Deer	9.0-11.8	----	----	No	0.1-1.0
Antelope	8.0-13.0	----	----	No	0.2-1.2
Deer and Antelope	15.0-34.0	19.0	172.9	Yes	----
Deer and Antelope	20.3-28.4	----	----	No	0.4
Deer and Antelope	27.8-36.0	----	----	No	0.8

Table 2-10. Prairie Dog Concentrations--Little Buffalo Basin CO2 Project.

Milepost	Miles	Acres	On Right-of-Way	Distance From Right-of-Way (Miles)
0-1.4	1.4	12.7	Yes	----
1.8-2.4	0.6	5.5	Yes	----
3.0-3.2	----	----	No	0.1
3.4-3.6	----	----	No	0.3
13.8-15.0	----	----	No	1.8-2.1
15.2-19.0	----	----	No	0.2-1.4
20.1-20.6	----	----	No	0.7

Table 2-11. Sage Grouse Leks--Little Buffalo Basin CO2 Project.

Milepost	Distance From Right-of-Way (Miles)	On Right-of-Way	Active In 1987	Last Known Activity
0	1.3	No	Unknown	Unknown
0	1.8	No	Unknown	Unknown
0	1.9	No	Unknown	Unknown
0	2.2	No	Unknown	Unknown
0	2.3	No	Unknown	Unknown
0	0.5	No	Unknown	Unknown
5	0.5	No	Yes	15 Birds
10	1.2	No	Yes	100+ Birds
13	0.1	No	Yes	10 Birds
22	0.3	No	Unknown	Unknown
29	1.2	No	Unknown	1962

Table 2-12. Sage Grouse Nesting/Rearing Habitat--Little Buffalo Basin CO2 P

Milepost	Miles	Acres	On Right-of-Way	Distance From Right-of-Way
0.2-2.4	2.4	21.8	Yes	----
3.2-7.4	4.2	38.2	Yes	----
8.9-15.3	6.4	58.2	Yes	----
20.2-24.1	3.9	35.4	Yes	----
27.7-30.0	2.3	20.9	Yes	----

2.5.4 Raptors

Three raptor nest sites occurred in the project area (Map 5). A Red-tailed hawk nest site is near milepost 6. The buffer zone for this species is a radius 0.3 mile, centered on the nest site; the edge of the right-of-way is 0.2 mile from the edge of the buffer zone. A Golden eagle nest site is near milepost 9. Its buffer zone has a radius of 0.6 mile. At its closest point, this is 1.2 miles from the edge of the right-of-way. The third nest site is that of a Ferruginous hawk, with a buffer zone radius of 1.2 miles. This intersects the right-of-way near milepost 15.

2.5.5 Aquatic Species

The proposed Little Buffalo Basin CO_2 Spur Pipeline would cross two perennial streams. Both Gooseberry Creek and Buffalo Creek have a designated trout fishery classification of 4. Gooseberry Creek is heavily influenced by irrigation demand. Neither stream supports a fishery of concern.

2.6 SALT CREEK CO_2 PROJECT

The spur pipeline to the Salt Creek Field would originate near milepost 230 of the extension of the Bairoil-Dakota CO_2 Pipeline. It would run approximately six miles east to the Salt Creek Field (Figure 2-5). The project is within the BLM Platte River Resource Area.

Comparatively few wildlife resources are located along the proposed right-of-way, partially due to its relative shortness, and its route across an Interstate Highway and in a very old oil field.

No big game crucial areas are in the vicinity. The North Natrona Mule Deer Herd Unit (Area 34) and North Natrona Antelope Hunt Area (73) include the project area.

One prairie dog town sits astride the right-of-way between mileposts 7.0 and 7.7. The right-of-way would occupy 6.4 acres.

Two raptor nest sites, both unidentified Buteo species, were recorded near milepost 5.0. The buffer zones would intersect the right-of-way, and have a seasonal restriction of surface disturbance between April 1 and July 15 if the nests are active.

Original data acquisition included a much larger area, to assist in the choice of a proposed right-of-way. This larger area showed 9 Prairie dog colonies, 48 raptor nest sites, and several Sage grouse leks. The location of the proposed right-of-way with its two-mile corridor was outside of the influence of these resources.

The proposed Salt Creek CO_2 Spur Pipeline does not cross any perennial streams.

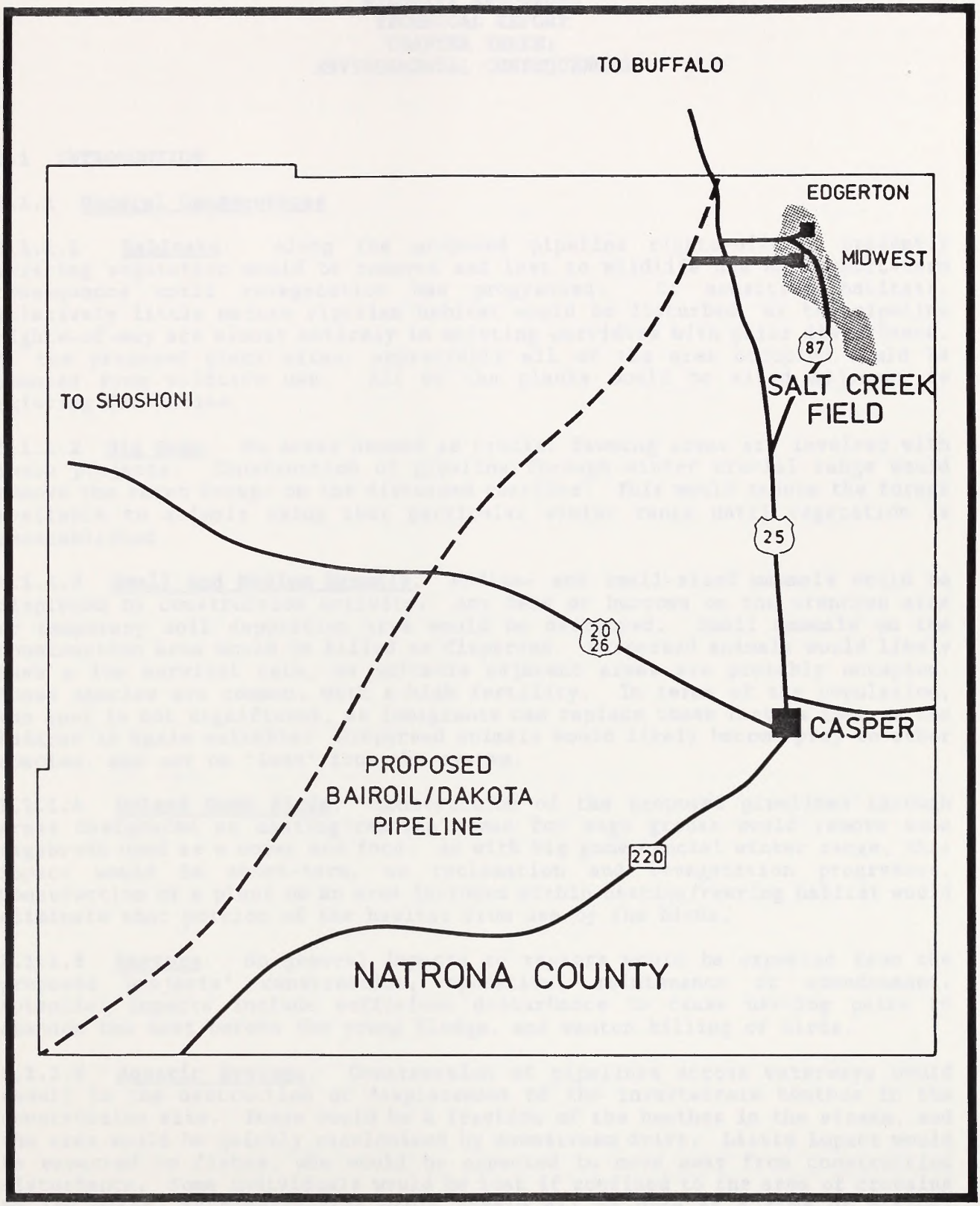


Figure 2—5. Proposed Salt Creek Project.

AMOCO CO_2 PROJECTS
WILDLIFE RESOURCES
TECHNICAL REPORT
CHAPTER THREE:
ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

3.1.1 General Consequences

3.1.1.1 Habitats. Along the proposed pipeline rights-of-way, presently existing vegetation would be removed and lost to wildlife use as a short-term consequence until revegetation has progressed. Of sensitive habitats, relatively little mature riparian habitat would be disturbed, as the pipeline rights-of-way are almost entirely in existing corridors with prior disturbance. At the proposed plant sites, appreciably all of the area occupied would be removed from wildlife use. All of the plants would be sited adjacent to existing facilities.

3.1.1.2 Big Game. No areas deemed as crucial fawning areas are involved with these projects. Construction of pipeline through winter crucial range would remove the shrub forage on the disturbed corridor. This would reduce the forage available to animals using that particular winter range until vegetation is reestablished.

3.1.1.3 Small and Medium Mammals. Medium- and small-sized mammals would be displaced by construction activity. Any dens or burrows on the trenched area or temporary soil deposition area would be destroyed. Small mammals on the construction area would be killed or dispersed. Dispersed animals would likely have a low survival rate, as suitable adjacent areas are probably occupied. These species are common, with a high fertility. In terms of the population, the loss is not significant, as inmigrants can replace those lost as soon as the habitat is again suitable. Dispersed animals would likely become prey to other species, and not be "lost" from the system.

3.1.1.4 Upland Game Birds. Construction of the proposed pipelines through areas designated as nesting/rearing areas for sage grouse would remove some sagebrush used as a cover and food. As with big game crucial winter range, this impact would be short-term, as reclamation and revegetation progresses. Construction of a plant on an area included within nesting/rearing habitat would eliminate that portion of the habitat from use by the birds.

3.1.1.5 Raptors. No general impacts to raptors would be expected from the proposed projects' construction, operation, maintenance or abandonment. Potential impacts include sufficient disturbance to cause nesting pairs to abandon the nest before the young fledge, and wanton killing of birds.

3.1.1.6 Aquatic Systems. Construction of pipelines across waterways would result in the destruction or displacement of the invertebrate benthos in the construction site. These would be a fraction of the benthos in the stream, and the area would be quickly recolonized by downstream drift. Little impact would be expected to fishes, who would be expected to move away from construction disturbance. Some individuals would be lost if confined to the area of crossing by low water, as construction would likely all be done at a time of minimal flows.

Construction during or soon after fish spawning could decrease the success of that year class of fish. Actual construction would destroy eggs at the crossing, and the increased sediment would settle as it was carried downstream. Salmonid eggs or newly hatched fry still in the sediment could be smothered for a distance downstream. Spawning success upstream of the crossing and downstream past the areas of deposition (estimated at up to three miles, BLM, 1985a) would not be affected.

Operation of the project entails the movement of CO_2 under waterways. Scenarios of a rupture or slow leak in open water and under ice and the effect of added CO_2 on the CO_2-bicarbonate-carbonate buffering system of fresh waters are discussed in the Water Resources Technical Report. In summary, a rupture initiates the closing of block valves, limiting the amount of CO_2 released. A rupture would occur with such force (operating pressure is 2,000 pounds per square inch) that gas and water would be thrown into the air, allowing much of the CO_2 to be vented into the atmosphere. Fish would be expected to move away from any disturbance (BLM, 1985a). The worst-case scenario combination would entail a slow leak, too small to trigger closure of block valves, under ice in a small stream. This could allow a buildup of CO_2, although diffusion through ice occurs. In a small pool, with free water sufficiently shallow and ice cover sufficiently thick to preclude fish movement, no break in the ice cover, and occurrence at the beginning of the ice season, it may be possible to accumulate sufficient CO_2 to stress the fish. CO_2 is not poisonous, but can cause suffocation if it exists in quantities large enough to physically displace oxygen. Such a scenario could only occur in a small section of stream.

3.1.1.7 Presence of Workers. The presence of construction workforces can have an impact on wildlife resources. Consequences of prior projects have included increased poaching, indiscriminate shooting of wildlife and increased road kills. The presence of additional people as a result of these proposed actions would likely increase the incidence of these impacts.

3.1.2 Potential Impact Avoidance

3.1.2.1 Big Game. The seasonal constraints to surface disturbance in crucial winter areas (Section 1.4) would be observed. As such, no construction would occur in crucial winter range until after the season of use. All trunk and spur pipelines would be built within one construction season.

In areas designated as crucial wildlife habitat by the Wyoming Game and Fish Department, grading and clearing would be kept to an absolute minimum, wherever possible. In particular, brush would be retained in the right-of-way except in areas graded for the ditch and on a portion of the working side where brush may make welding of pipe joints unsafe. Brush would not be bladed in areas of crucial wildlife habitat; a brush beater may be used to allow vehicles to travel on the right-of-way in these areas.

The potential for a long-term effect would be lessened by required reclamation procedures and agency input to seed mixes, allowing a faster recovery of forage (Vegetation Technical Report and Measures Appendix).

3.1.2.2 Small and Medium Mammals. The mammal of particular concern is the endangered Black-footed ferret. Prairie dog concentrations have been mapped for all proposed rights-of-way. The potential exists for other prairie dog concentrations to be established prior to time of construction. Qualified

persons would do ferret surveys in coordination with the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service, within the agency-proscribed time span.

3.1.2.3 Upland Game Birds. Seasonal constraints to surface disturbance in sage grouse nesting/rearing areas (Section 1.4) would be observed. Construction of trunk and spur pipelines would not begin until after the end of the restricted time (May 31) in areas mapped for sage grouse nesting/rearing areas. Reclamation and revegetation would expedite recovery of the habitat, avoiding a long-term impact.

3.1.2.4 Raptors. Seasonal constraints and areas susceptible to impact are determined for each raptor species by each BLM area. Observance of these restrictions would prevent construction activities from affecting nesting raptors until after the young birds have fledged. Only active nests need to be considered; mapped nest sites with areas of no surface disturbance that intersect a right-of-way would be checked in the year of construction, in coordination with the appropriate BLM Area Wildlife Biologist.

3.1.2.5 Aquatic Systems. Impacts to fisheries largely entail the potential loss of a portion of one year's spawn for some of the salmonid species, from destruction of eggs by sedimentation or crushing. These can be avoided by the timing of construction. From an engineering viewpoint, optimal crossing of waterways is done at low water during the construction season. For the proposed trunk and spur pipelines, this is September to October. Construction prior to October would allow the disturbance and sediment deposition to occur prior to spawning.

3.1.2.6 Presence of Workers. Increases in poaching, indiscriminate killing of wildlife and roadkills have occurred with past large construction projects in Wyoming. For the proposed projects, the large majority of workers would be Wyoming residents (Socio-Economic Technical Report). Any poaching, indiscriminate killing of wildlife or roadkills (occurring on nonwork-related travel) by these residents would not be increased, but would be part of the baseline that would have occurred without the proposed projects.

Amoco Production Company has and enforces policies of no firearms allowed on the work site and dismissal of any employee convicted of a major game law violation. The potential of increased roadkills due to project traffic would be reduced by the use of buses. All workers on plant construction and field gathering lines would be required to ride buses to and from the town of origin to the plant site. One bus effectively replaces 28 private vehicles (Transportation Technical Report).

3.2 FONTENELLE CO_2 SUPPLY PROJECT

The plant site would occupy 40 acres enclosed by a chain link fence. A portion of this area includes the edge of a sage grouse nesting/rearing area, as defined by a radius of two miles from the center of the lek. No significant impact would be expected, as the location is adjacent to the existing large Shute Creek Gas Plant and paved access road. Any use of this small portion of the overall area would have been affected by the presence of the Shute Creek Plant.

The portion of the pipeline serving the western portion of the Raptor Field would cross approximately two miles of crucial deer and antelope winter range, approximately 20 acres would be disturbed under a worst-case scenario, ignoring

the impact avoidance discussed in Section 3.1.2.1. The portion of the gas gathering system serving the eastern portion of the field would disturb moose crucial winter range at the Green River, approximately six acres under a worst-case scenario. Neither of these would be considered significant, as the numbers do not exceed 10 percent of the total available crucial habitat in the one-mile corridor, disturbance would not occur during the season of use and less than 1 percent of the total habitat within a one-mile corridor is disturbed.

The pipeline would cross the Green River at an existing crossing. Impacts to riparian habitat would not be significant, defined as greater than 1 percent of the riparian habitat occurring within the one-mile-wide corridor.

Based upon the amount of resident workers and Amoco's policies and busing, increases in poaching, wanton killing and harassment would not likely exceed 15 percent, and would not be considered significant.

Aquatic invertebrates on the trench line across the Green River would be impacted by construction, as discussed in Section 3.1.2 above. Most organisms would be dislodged into the water column and carried downstream. Some organisms would be buried. The area is a small percentage of habitat and is not unique habitat. Recolonization by drift would occur over a short time. Habitat in the area of the crossing was diminished by the extended flows released to drain Fontenelle Reservoir (Stone, 1988). Some remedial work may be done when normal operations can be initiated at Fontenelle Dam. Scheduled construction of the proposed project would allow crossing of the Green River prior to the resumption of normal flows and remedial substrate work, reducing the potential impact of construction.

Potential impacts to kokanee salmon are disruption of spawning run and deposition of sediment on eggs and fry if any spawning occurred downstream of the crossing. Crossing the Green River prior to October 1 would eliminate the potential interference to the spawning run, and any increase in sediment would be cleared away by the river currents before the time of spawning.

Brown trout spawn in the general area of the proposed crossing in mid-October (Dufek, 1988). The timing of crossing as discussed above would also minimize potential impacts to brown trout. Rainbow trout spawn in the spring. Young of the year would be large enough to move away from the construction area.

CO_2 released into the Green River from a rupture could exceed the significance criterion of 15 parts per million right at the site of the rupture. This concentration zone would be small, as the gas vents to the atmosphere and the dissolved portion is diluted. Fishes would move away from the area of disturbance.

In-stream construction activities on the Green River could exceed the significance criterion in persisting for more than eight hours. The construction should be completed within one working day; however, avoidance of times of salmonid spawning may preclude crossing at the optimal engineering time, and the construction may not be completed within eight hours. This would exceed the significance criterion of maximum time in the stream, but would avoid the significant impacts of disruption or sedimentation of a spawning site.

The Green River crossing is unique in these proposed actions in that the pipeline contains a small amount (approximately 1.15 percent) of hydrogen sulfide, a toxic gas. Scenarios of a rupture or a slow leak and effects on water quality are discussed in the Water Resources Technical Report. Rupture

would occur with sufficient force to vent much of the gas to the atmosphere, as described above. Because of the potential toxic effects of hydrogen sulfide, block valves have been designed for both sides of the Green River crossing, limiting the amount of material lost in a rupture. The slug of hydrogen sulfide dissolved would be carried downstream, undergoing dilution and oxidation. Some fish loss would likely occur downstream in close proximity to the rupture site. A rupture would occur at a point, not across the entire river, and fishes could escape the contaminated water by lateral as well as upstream movement.

A leak slow enough to escape detection could create a worst-case scenario of introduction of hydrogen sulfide to salmonid eggs or fry downstream of the leak, with the loss of those eggs and fry. A leak so small as not to trigger closure of the block valves would have the potential to affect the actual area of the leak, with downstream effects slowly spreading laterally, but becoming diluted as they spread. Effects of the hydrogen sulfide, even in the worst-case scenario, would affect only one year's recruitment, and only downstream of the point of release.

In the unlikely event of a serious fish kill, Amoco would consult with the Wyoming Game and Fish Department on stocking procedures to replace the impacted resource.

3.3 ELK BASIN CO_2 PROJECT

The plant would occupy 40 acres surrounded by a chain link fence. This area would appreciably be lost to wildlife use. Seven areas of deer or antelope crucial winter range would be crossed (Table 2-3). Block valve stations, each occupying one-tenth of an acre, would be sited in crucial winter range near mileposts 67, 105, 125 and 141, occupying a total of 0.4 acre. These four 0.1-acre areas would be removed from wildlife use as a long-term impact. This is not a significant impact. The right-of-way would be reclaimed and revegetated to agency standards, resulting in a short-term impact (Vegetation Technical Report). No construction would occur in crucial habitats during the season of use, as the BLM seasonal constraints on these wildlife resources would be observed.

As noted on Table 2-5, the standard definition of a lek indicated the right-of-way would intersect two individual leks. Field investigations with Cody BLM Wildlife Biologists were done on February 12, 1988. The open area actually used for strutting and breeding purposes on Lek #7 is east of the right-of-way. Lek #9 was recorded from a 1972 report containing an imprecise location; no more recent data are available. Because the disturbance would not occur during the season of use, would be reclaimed prior to the next breeding season and would not occur on a known active area of a lek, a variance from the No Surface Disturbance Policy was requested.

Less than 1 percent of the total habitat within a one-mile-wide corridor would be disturbed.

One species of local concern, the Thirteen-lined ground squirrel, could be impacted by construction of pipeline through its habitat. Widespread distribution of poison grain has extirpated or nearly extirpated this subspecies.

The pipeline would cross the Shoshone, Greybull and Bighorn rivers at existing pipeline crossings. Impacts to riparian habitat would not be significant,

defined as greater than 1 percent of the riparian habitat occurring within the one-mile-wide corridor. Riparian habitat along the smaller streams is patchily distributed, but the pipeline route does not intersect any extraordinary riparian zones on any particular creek. Because the crossing corridor is only 75 feet wide (no staging area required by small creek), the disturbance will not equal or exceed 1 percent of riparian habitat in the one-mile-wide corridor.

Based upon the amount of resident workers and Amoco's policies and busing, increases in poaching, wanton killing and harassment would not likely exceed 15 percent, and would not be considered significant.

Aquatic invertebrates on the trench line would be impacted by construction, as discussed in Section 3.1.2 above. Most organisms would be dislodged into the water column and carried downstream. Some organisms would be buried. The area is a small percentage of habitat and is not unique habitat. Recolonization by drift would occur over a short time.

Potential impacts to trout are disruption of spawning and deposition of sediment on eggs and fry if any spawning occurred downstream of the crossing. Crossing prior to October 1 would eliminate the potential interference to spawning, and any increase in sediment would be cleared away by the river currents before the time of spawning.

Brown trout spawn in the general area of the proposed crossings in mid-October (Kent, 1988; Yeckel, 1988). The timing of crossing as discussed above would also minimize potential impacts to brook trout. Rainbow trout spawn in the spring. Young of the year would be large enough to move away from the construction area.

CO_2 released into one of the rivers from a rupture could exceed the significance criterion of 15 parts per million right at the site of the rupture. This concentration zone would be small, as the gas vents to the atmosphere and the dissolved portion is diluted. Fishes would move away from the area of disturbance.

In-stream construction activities on the Shoshone, Greybull or Bighorn River could exceed the significance criterion in persisting for more than eight hours. The construction should be completed within one working day; however, avoidance of times of salmonid spawning may preclude crossing at the optimal engineering time, and the construction may not be completed within eight hours. This would exceed the significance criterion of maximum time in the stream, but would avoid the significant impacts of disruption or sedimentation of a spawning site.

3.4 BEAVER CREEK CO_2 PROJECT

The plant site would occupy 40 acres enclosed by a chain link fence, adjacent to existing facilities. A large deer and antelope crucial winter range is crossed between mileposts 21 and 39. A block valve station, occupying 0.1 acre, would likely be located within that stretch of the pipeline. This acreage would be removed from use as a long-term impact. This would not be considered significant, as the disturbance does not exceed 10 percent of the total available crucial habitat in the one-mile corridor, disturbance would not occur during the season of use and less than 1 percent of the total habitat within a one-mile corridor is disturbed.

The pipeline would cross the Sweetwater River at an existing pipeline crossing. Impacts to riparian habitat would not be significant, defined as greater than 1 percent of the riparian habitat occurring within the one-mile-wide corridor.

Based upon the amount of resident workers and Amoco's policies and busing, increases in poaching, wanton killing and harassment would not likely exceed 15 percent, and would not be considered significant.

Aquatic invertebrates on the trench line would be impacted by construction, as discussed in Section 3.1.2 above. Most organisms would be dislodged into the water column and carried downstream. Some organisms would be buried. The area is a small percentage of habitat and is not unique habitat. Recolonization by drift would occur over a short time.

Potential impacts to trout are disruption of spawning and deposition of sediment on eggs and fry, if any spawning occurred downstream of the crossing. Crossing the waterways prior to October 1 would eliminate the potential interference to the spawning, and any increase in sediment would be cleared away by the river currents before the time of spawning.

Brown trout spawn in the general area of the proposed crossing in mid-October (Dufek, 1988). The timing of crossing as discussed above would also minimize potential impacts to brook trout in Crooks Creek.

CO_2 released into the Sweetwater River from a rupture could exceed the significance criterion of 15 parts per million right at the site of the rupture. This concentration zone would be small, as the gas vents to the atmosphere and the dissolved portion is diluted. Fishes would move away from the area of disturbance.

In-stream construction activities on the Sweetwater River could exceed the significance criterion in persisting for more than eight hours. The construction should be completed within one working day; however, avoidance of times of salmonid spawning may preclude crossing at the optimal engineering time, and the construction may not be completed within eight hours. This would exceed the significance criterion of maximum time in the stream, but would avoid the significant impacts of disruption or sedimentation of possible spawning sites.

3.5 LITTLE BUFFALO BASIN CO_2 PROJECT

The plant site would occupy 40 acres surrounded by a chain link fence. This area is within a sage grouse nesting/rearing area. This would constitute a long-term removal of wildlife habitat.

One four-mile stretch of right-of-way traverses an area of antelope crucial winter range. Five sage grouse nesting/rearing areas would be crossed.

Neither of these would be considered significant, as the disturbance does not exceed 10 percent of the total available crucial habitat in the one-mile corridor, disturbance would not occur during the season of use and less than 1 percent of the total habitat within a one-mile corridor is disturbed.

Impacts to riparian habitat would not be significant, defined as greater than 1 percent of the riparian habitat occurring within the one-mile-wide corridor. One potential exception is a small cattail marsh/farm pond (described in the

Vegetation Technical Report). If this pond were interdicted, more than 1 percent of the riparian habitat at that point of the corridor could be disturbed.

One area of concern is the Killifish Riparian Exclosure along the pipeline route. In this BLM-managed area, the amount of disturbance would be kept to a minimum. All activity would be limited to the bench area south of the highway, north of the actual riparian area. Fences would not be left open overnight in the event passage through the Exclosure requires more than one day. The BLM Grass Creek Area Manager would be notified prior to construction of the pipeline through the Killifish Exclosure.

Based upon the amount of resident workers and Amoco's policies and busing, increases in poaching, wanton killing and harassment would not likely exceed 15 percent, and would not be considered significant.

Aquatic invertebrates on the trench line would be impacted by construction, as discussed in Section 3.1.2 above. Most organisms would be dislodged into the water column and carried downstream. Some organisms would be buried. The area is a small percentage of habitat and is not unique habitat. Recolonization by drift would occur over a short time.

3.6 SALT CREEK CO_2 PROJECT

The Salt Creek CO_2 Recycle Plant would occupy 40 acres, adjacent to existing facilities. The only wildlife resources mapped are two unidentified raptor nest sites and one prairie dog concentration. Any potential impacts would be eliminated with ferret surveys and observance of seasonal restrictions, should the prairie dog colony or raptor nests be active at the time of construction.

Based upon the amount of resident workers and Amoco's policies and busing, increases in poaching, wanton killing and harassment would not likely exceed 15 percent, and would not be considered significant.

AMOCO CO_2 PROJECTS
WILDLIFE RESOURCES
TECHNICAL REPORT
CHAPTER FOUR:
THREATENED AND ENDANGERED SPECIES
AND SPECIES OF SPECIAL CONCERN

4.1 LISTED AND PROPOSED SPECIES

4.1.1 Introduction

Four animal species were noted by the U.S. Fish and Wildlife Service (Starkey, 1987) to be addressed in a biological assessment. All are listed as Endangered by the U.S. Fish and Wildlife Service.

Listed Species	Expected Occurrence
Bald eagle (Haliaeetus leucocephalus)	Winter resident, migrant
Peregrine falcon (Falco peregrinus)	Migrant
Whooping crane (Grus americana)	Spring-fall resident, migrant (Lincoln, Sweetwater and Fremont counties)
Black-footed ferret (Mustela nigripes)	Potential resident in Prairie dog (Cynomys sp.) towns

Proposed Species

None

Bald Eagle

Breeding Range: Formerly throughout North America north of Mexico. Today the center of their abundance remains in Alaska and across Canada south of treeline. They breed southward to northern California, northern Idaho, eastward through Great Lakes region, and on to Newfoundland and New England. Disjunct populations occur in Arizona, Gulf States and Chesapeake Bay area.

Wintering Range: Northern populations drift southward as far as southern California, intermountain regions, plains states, to the Atlantic Ocean. Disjunct populations are fairly sedentary.

Habitats: Bald Eagles have a preference for water habitats of all kinds, from ocean coasts, lakes, ponds, rivers and streams. They roost in live or dead trees or cliffs.

Habits and Food: Their diet consists mainly of fish, caught on the wing with their talons, or "pirated" from Ospreys or other eagles. They also scavenge from carrion, and hunt waterfowl and small mammals; these sources are especially important when ice cover makes fish unavailable.

Peregrine Falcon

Breeding Range: Formerly throughout North America, but today much reduced. From Alaska across to Greenland, southward along Pacific coast to at least central California, disjunct populations in the Rocky Mountain area into

northern Mexico, and recent reintroductions along the eastern seaboard. "Hacking" programs elsewhere have been met with mixed success.

Wintering Range: Highly migratory. Birds from the northern edge of their range have been found all the way into South America. Small numbers are to be found through the U. S. during the Winter. Peregrine falcons are also found on every continent of the world, made up of several races. Formerly known as Duck Hawk.

Habitats: This wide-ranging species inhabits every habitat to be found in North America, from ocean coasts and islands to mountainous terrain, forests, suburbia, deserts, tundra, etc. They have a preference for open areas such as coastal areas, plains, lakes and the like in search of prey.

Habits and Food: They feed on a variety of prey, from small and large birds such as ducks, shorebirds, alcids and even pigeons in cities. Small mammals as food play a small part.

Whooping Crane

Breeding Range: Freshwater marshes in the vicinity of Wood Buffalo National Park, Alberta, Canada. A second "transplant" population is established at Grays Lake National Wildlife Refuge, Idaho, within the flocks of Sandhill Cranes.

Wintering Range: Salt marshes in the vicinity of Aransas National Wildlife Refuge on the Gulf coast of Texas. The Greys Lake birds winter at Bosque del Apache National Wildlife Refuge, New Mexico.

Habits, Habitats: These birds were once reduced to less than 30 birds in the early 1960s, many of them in captivity. Since then, aggressive efforts to raise them in captivity and protect them in the wild have helped raise their number to over 100 birds. The migration routes of both populations are well known and monitored. They migrate in family groups, stopping along the way to rest and feed. Their food consists of a variety of vertebrates and invertebrates such as frogs, fish and insects.

Black-footed Ferret

Range: Black-footed ferrets once ranged from Canada to Texas. Historically the species occupied all non-mountainous areas in Wyoming (Clark and Stromberg, 1987). The only known location was near Meeteetse. This colony apparently no longer exists. Some members of this colony currently comprise a captive breeding population.

Habitats: Prairie dog colonies are considered the best indicators of Black-footed ferret habitat.

Habits and Food: The Black-footed ferret is a predator. The animals hunt and seek shelter in Prairie dog burrows.

4.1.2 Fontenelle CO_2 Supply Project

Three BLM Resource Areas converge near the project area (Kemmerer, Green River and Pinedale). The Pinedale Resource Area is north of the proposed project, but all three BLM areas border Fontenelle Reservoir, making it a common area.

No reported nest sites of any of the listed bird species occur near the proposed plant site or pipeline corridor.

Primary winter concentrations (October to May) of Bald eagles are along the Green River between Big Piney and Fontenelle Reservoir (BLM, 1986a). Bald eagles are reported as occasional along the major river systems (BLM, 1985b), which would include the Green River in the area of the proposed project.

Peregrine falcons use the Green River as a spring and fall migration corridor, but there are no reported breeding pairs in the proposed project area.

The Grays Lake National Wildlife Refuge in Idaho has a program to establish a second wild population of whooping cranes. The whooping cranes are hatched and reared by sandhill cranes. The whooping cranes have adopted the migration routes of the sandhill cranes (BLM, 1986b), which can bring them near the project area. An area of seasonal no surface disturbance has been established along Fontenelle Creek. This is not near the proposed plant or pipeline. At its nearest, the area is 1.5 miles from the disjunct northwestern portion of the Raptor Unit.

Only one Prairie dog concentration was mapped in the proposed project area. Other concentrations likely exist. In the past, sightings of possible Black-footed ferrets have been recorded in the area of the Seedskadee Wildlife Refuge (Martin, 1981), which begins approximately two miles south of the proposed projects' crossing of the Green River. Sightings have been reported in the region (BLM, 1978; BLM, 1985b; BLM, 1986a).

The proposed Fontenelle CO_2 Supply Project would not be expected to affect any of these species. No nest sites of any of the birds are recorded. Should a nest become established, it would be afforded seasonal protection. The crossing of the Green River would involve few, if any, mature riparian trees potentially used for winter roosting. No cliff habitat, potential nesting for the Peregrine falcon, would be involved. Surveys would be done for Black-footed ferrets in areas of Prairie dog towns when warranted. These measures would avoid impacts in the event that any of the species were encountered.

4.1.3 Elk Basin CO_2 Project

The proposed Elk Basin CO_2 Trunk Pipeline would cross five BLM areas: Cody, Grass Creek, Washakie, Lander and Platte River.

Bald Eagle winter roosting occurs along the area's major rivers (Shoshone, Greybull and Bighorn). No nest sites were recorded anywhere along the pipeline's two-mile corridor. Because the proposed pipeline crosses each river at one or more pipeline crossings, a minimal removal, if any, of mature riparian vegetation would be expected. Some removal could occur at the Bighorn River crossing, as the area has been revegetated since the last construction.

Attempts are being made to re-introduce the Peregrine falcon in Yellowstone and Teton Parks, north and west of the project area. Observation of Peregrine falcons have been infrequent (BLM, 1984; BLM, 1986b; BLM, 1986c; BLM, 1988) along the route of the proposed pipeline.

Several Prairie dog concentrations are reported along the 178-mile proposed pipeline. All areas of Prairie dog concentrations are considered potential Black-footed ferret habitat.

The proposed Elk Basin CO_2 Project would not be expected to affect the Bald eagle, Peregrine falcon or Black-footed ferret. Should an active nest of either bird species become established, it would be afforded seasonal protection from surface disturbance. Surveys would be done using approved methods and by qualified personnel for Black-footed ferrets in Prairie dog concentrations where warranted. These surveys, with any resulting actions, would avoid impacts to the Black-footed ferret.

4.1.4 Beaver Creek CO_2 Project

The proposed Beaver Creek CO_2 Project is within the BLM Lander Resource Area. No historical or recent Bald eagle nesting activity has been documented in the Lander Resource Area (BLM, 1986c), although some overwintering may occur along the Sweetwater River. The Peregrine falcon is a rare migrant, and no recent nesting activity has been documented in the resource area. The proposed project is not within any of the areas noted (BLM, 1986c) as having potential cliff nest sites suitable for the Peregrine falcon. No nests of either bird species were recorded for the area of the proposed plant site or along the two-mile-wide corridor mapped for the proposed pipeline.

Prairie dog concentrations have been mapped along the proposed pipeline right-of-way. Prairie dog concentrations are considered potential habitat for the Black-footed ferret.

The proposed Beaver Creek CO_2 Project would not be expected to affect the Bald eagle, Peregrine falcon or Black-footed ferret. Should an active nest of either bird species become established, it would be afforded seasonal protection from surface disturbance. Surveys would be done using approved methods and by qualified personnel for Black-footed ferrets in Prairie dog concentrations where warranted. These surveys, with any resulting actions, would avoid impacts to the Black-footed ferret.

4.1.5 Little Buffalo Basin CO_2 Project

The entire Little Buffalo Basin CO_2 Project is within the BLM Grass Creek Resource Area. No nest sites of either Bald eagles or Peregrine falcons were mapped within the two-mile-wide pipeline corridor. No major rivers are present, but the right-of-way parallels Gooseberry Creek, which could provide tree habitat for overwintering birds. No cliff sites are available for potential Peregrine falcon nesting. The Peregrine falcon is an occasional migrant in the general area.

Prairie dog concentrations were mapped along the two-mile corridor containing the right-of-way. The presence of Prairie dog colonies indicates potential habitat for the Black-footed ferret. Additionally, the last known Black-footed ferret population existed in the Meeteetse area. Interest in that colony resulted in surveys throughout the area.

The proposed Little Buffalo Basin CO_2 Project would not be expected to affect the Bald eagle, Peregrine falcon or Black-footed ferret. Should an active nest of either bird species become established, it would be afforded seasonal protection from surface disturbance. Surveys would be done using approved methods and by qualified personnel for Black-footed ferrets in Prairie dog

concentrations where warranted. These surveys, with any resulting actions, would avoid impacts to the Black-footed ferret.

4.1.6 Salt Creek CO_2 Project

The proposed Salt Creek CO_2 Project is within the BLM Platte River Resource Area. The proposed plant would be placed within a very old oil field (100+ years), and the serving CO_2 pipeline would be nine miles long, partially within the oil field, and crossing under Interstate 25. As the proposed project area is comparatively small and largely within a disturbed area, potential impacts to wildlife are minimized.

No Bald eagle or Peregrine falcon nestings have been reported. The only raptor nests along the route are two non-specific buteo nests. One Prairie dog concentration was mapped.

The proposed Salt Creek CO_2 Project would not be expected to affect the Bald eagle, Peregrine falcon or Black-footed ferret. Should an active nest of either bird species become established, it would be afforded seasonal protection from surface disturbance. Surveys would be done using approved methods and by qualified personnel for Black-footed ferrets in Prairie dog concentrations where warranted. These surveys, with any resulting actions, would avoid impacts to the Black-footed ferret.

4.2 CANDIDATE SPECIES

4.2.1 Introduction

Candidate Species are those under consideration by the U.S. Fish and Wildlife Service for listing as Threatened or Endangered. All of the Candidate Species noted by the U.S. Fish and Wildlife Service (Starkey, 1987) in relation to this project belong to Category 2. Category 2 comprises taxa for which information now in possession of the U.S. Fish and Wildlife Service indicates that proposing to list the species as Threatened or Endangered is possibly appropriate, but for which conclusive data on biological vulnerability and threat(s) are not currently available to support proposed rules at this time (Federal Register, 1984).

4.2.2 Species

Candidate Species were listed by the U.S. Fish and Wildlife Service (Starkey, 1987) as follows:

Candidate Species	Expected Occurrence
White-faced ibis (*Plegadis chihi*)	Summer resident
Swainson's hawk (*Buteo swainsoni*)	Summer resident
Ferruginous hawk (*Buteo regalis*)	Year-round resident
Mountain plover (*Charadrius montanus*)	Summer resident of semi-arid grasslands, shortgrass prairies, plains and plateaus
Long-billed curlew (*Numenus americanus*)	Spring/summer resident
Allen's thirteen-lined ground squirrel (*Spermophilus tridecemlineatus alleni*)	May occur outside mountainous areas

Wyoming cave snail (Physa spelunca)	Resident of Lower Cane Cave, near Lovell, Wyoming

White-faced Ibis

Breeding: SE Oregon sporadically eastward to Minnesota, south to the Gulf coast of Texas. A few nest in coastal southern California.

Winter: Central Valley of California, southern California and coastal Texas and Louisiana. Also around the south Salton Sea.

Habits, Habitats: Frequenting various marshy habitats, they wade into water or through vegetation poking their bills into mud in search of invertebrates. They often roost with egrets and herons. Their nesting takes place in extensive marshes or islands of cattails or other marsh grass. Their numbers have declined due to development of their nesting and feeding areas, as well as draining for agriculture.

Swainson's Hawk

Breeding: Widespread over much of western half of U. S., extending NW into Southern Alaska, south into northern Mexico.

Winter: Very few are documented for U. S., most migrate to South America.

Habits, Habitat: These birds inhabit open plains, Prairies and terrain, feeding on a variety of insects. Their migration flocks are well known, circling in "kettles" numbering dozens to hundreds of birds in rising thermals. Control or eradication of their primarily insect diet has resulted in reduced numbers and their range becoming less concentrated in area.

Ferruginous Hawk

Breeding: Interior western U. S., north to south-central Canada, in grassland to semi-arid plains.

Winter: Shifting south and west from northern California to Nebraska, Texas, into northern Mexico.

Habits, Habitat: Feeding mostly on mammals such as ground squirrels and rabbits, these birds soar and hover overhead or scan from posts, poles or even on the ground.

Mountain Plover

Breeding: Arid grassy habitat from Montana to north Texas during the nesting season.

Winter: Migrate south to open fields and plains from central California, southern Arizona, to south Texas, southward across northern Mexico.

Habits, Habitat: Inconspicuous to quiet, they are found in groups during the non-breeding season, taking insects from plowed ground, mowed alfalfa or wheat fields, or short grassland.

Long-billed Curlew (Numenius americana)

Breeding: In wet and dry grassland, meadows, pastures from south-central Canada to northeastern California and northern Texas, also Gulf Coast of Texas. Formerly more numerous and widespread before transformation of grasslands to plains to cattle range, farms and urbanization.

Winters: From northern California, southern Arizona, down west coast of Mexico; Texas, and Louisiana down east coast of Mexico.

Habits, Habitat: Feeding on a variety of invertebrates, small amphibians, they frequent coastal and lake beaches, salt marshes, mudflats, fields and farmlands.

Allen's Thirteen-lined Ground Squirrel (Spermophilus tridecemlineatus alleni)

Range: The Thirteen-lined ground squirrel occurs throughout most of the central United States (Clark and Stromberg, 1987). Four subspecies are identified; the animal of note here is the subspecies alleni. This subspecies occurs in the Big Horn Mountains area.

Habits: Grasslands, in groups frequently, but the grouping results from habitat patches and not from sociality (Clark and Stromberg, 1987). Highly carnivorous, eating insects, birds, young rabbits, lizards. Grass and seeds complement the animal prey.

Wyoming Cave Snail (Physa spelunca)

The Wyoming cave snail's habitat is Lower Cane Cave near Lovell. This project would not affect that habitat.

4.2.3 Potential Effects

None of the bird species would likely be affected by the proposed projects. The White-faced ibis is uncommon, and while construction of the pipeline through a river crossing could disturb foraging, the disturbance would be very limited in both time and space.

BLM-mandated seasonal restrictions would protect the Swainson's and Ferruginous hawks' active nests along the proposed right-of-way. There is a possibility of the Mountain plover along the route, but the species is generally north of the area. A linear facility would disturb little habitat, and this would be revegetated. Two Long-billed curlew nesting concentrations are noted in Wyoming, with one in the Cody Resource Area. The proposed projects would not affect that area.

Allen's Thirteen-lined ground squirrel could be affected by construction of the Elk Basin CO_2 Trunk Pipeline and the Little Buffalo Basin CO_2 Spur Pipeline. The former traverses the squirrel's range and crosses some of its preferred grassland habitat. The Little Buffalo Basin CO_2 Spur Pipeline is within the species' range, and its route along the Gooseberry Creek drainage would probably cross some grasslands.

Individuals residing on the right-of-way would probably be lost to the population. Possible displacement to nearby habitat is reduced by those habitats being already occupied. Conversely, individuals living adjacent to the

right-of-way may find prey more abundant, as small mammals and reptiles are displaced by construction.

Effects would be short-term and limited to the construction zone. Habitat would be reclaimed. With a preferred habitat of grassland, the right-of-way would be recolonized by the species in the following season.

Clark and Stromberg (1987) report the major reason for the decline or possible extirpation of the species is the widespread use of poison grain. Existence of the subspecies, if it indeed still exists, would be more affected by this widespread, continuous poisoning than by the one-year effects of a linear disturbance.

The Wyoming cave snail's habitat would not be affected by the proposed projects.

AMOCO CO_2 PROJECTS
WILDLIFE RESOURCES
TECHNICAL REPORT
CHAPTER FIVE:
REFERENCES

Baxter, George T., and James R. Simon. 1970. Wyoming Fishes. Wyoming Game and Fish Department. Cheyenne, Wyoming. 168 pp.

Bureau of Land Management. 1978. Proposed Domestic Livestock Grazing Management Program for the Sandy Area, Final EIS. Rock Springs, Wyoming. 180 pp.

Bureau of Land Management. 1984. Platte River Resource Area Draft Environmental Impact Statement. Casper, Wyoming. 366 pp.

Bureau of Land Management. 1985a. Draft Environmental Impact Statement on the Bairoil/Dakota Carbon Dioxide Projects. Cheyenne, Wyoming. 252 pp.

Bureau of Land Management. 1985b. Kemmerer Resource Area Resource Management Plan Draft Environmental Impact Statement. Kemmerer, Wyoming. 315 pp.

Bureau of Land Management. 1986a. Pinedale Resource Management Plan Draft Environmental Impact Statement. Rock Springs, Wyoming. 368 pp.

Bureau of Land Management. 1986b. Draft Resource Management Plan/Environmental Impact Statement for the Washakie Resource Area. Worland, Wyoming. 222 pp.

Bureau of Land Management. 1986c. Final Resource Management Plan Environmental Impact Statement for the Lander Resource Area. Lander, Wyoming. 378 pp.

Bureau of Land Management. 1988. Cody Resource Area Resource Management Plan Draft Environmental Impact Statement. Preliminary Draft. Cody, Wyoming.

Calhoun, Alex, ed. 1966. Inland Fisheries Management. California Department of Fish and Game. 546 pp.

Carlander, Kenneth D. 1969. Handbook of Freshwater Fishery Biology Volume One. The Iowa Sate University Press. Ames, Iowa. 752 pp.

Clark, Tim W., and Mark R. Stromberg. 1987. Mammals in Wyoming. University of Kansas Museum of Natural History. Lawrence, Kansas. 314 pp.

Dufek, D., Wyoming Game & Fish Department. 1988. Telephone conversations with Planning Information Corporation regarding fisheries, January 12 and March 1.

Kent, R., Wyoming Game and Fish Department, Cody. 1988. Interview, February 11, and telephone conversation, March 1, with Planning Information Corporation regarding fisheries.

Martin, Stephen, U.S. Fish and Wildlife Service, Denver Wildlife Research Center, Fort Collins, Colorado. 1981. Letter to Jim Matthews regarding Black-footed ferret sightings near Seedskadee Wildlife Refuge. July 29.

Seeley, Charles M., and George W. McCammon. 1966. Kokanee. In Inland Fisheries Management, edited by Alex Calhoun. pp. 274-294. California Department of Fish and Game.

Sigler, William F., and Robert Rush Miller. 1963. Fishes of Utah. Utah State Department of Fish and Game. Salt Lake City, Utah. 203 pp.

Staley, Jerome. 1966. Yields of California lakes. In Inland Fisheries Management, edited by Alex Calhoun. pp. 140-143. California Department of Fish and Game.

Starkey, R. G., U.S. Fish and Wildlife Service, Casper, Wyoming. 1987. Memorandum to Casper Bureau of Land Management District Manager regarding Amoco CO_2 Projects species list. November 16.

Stone, M., Wyoming G&F Cheyenne. 1988. Interview with Planning Information Corporation regarding Green River fishery status, February 8.

Wyoming Game and Fish Department. 1983. A Strategic Plan for the Comprehensive Management of Wildlife in Wyoming 1984-1989 Volume III. Wyoming Game and Fish Department. 89 pp.

Wyoming Game and Fish Department. 1985. The Mule Deer of Wyoming. Wyoming Game and Fish Department. Cheyenne, Wyoming. 154 pp.

Yekel, S., Wyoming G & F Cody. 1988. Interview, February 11, and telephone conversation, March 1, with Planning Information Corporation regarding fisheries.

R.110W R.109W R.108W R.107W R.106W

T. 26 N

T. 25 N

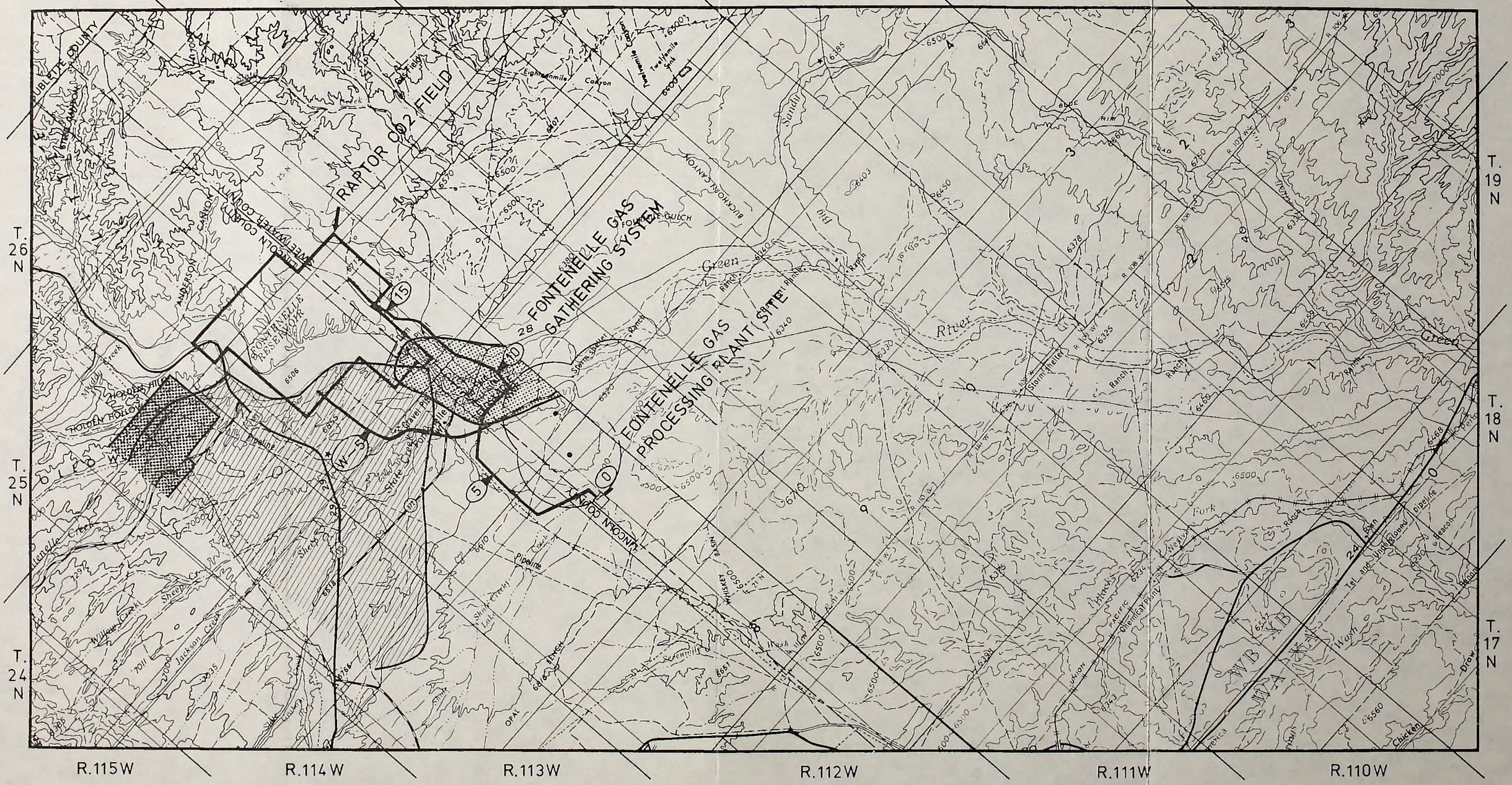
T. 24 N

T. 19 N

T. 18 N

T. 17 N

R.115W R.114W R.113W R.112W R.111W R.110W



LEGEND

- Proposed Pipeline Route
- Alternative Route
- Existing or Approved Route
- 10 Milepost

5 0 5
miles

N

- Sage Grouse Nesting Area
- Crucial Deer & Antelope Winter Range
- Whooping Crane
- Crucial Moose Winter Range

Map 1. Fontenelle Project.

R.98W R.97W R.96W R.95W R.94W

T. 7 S

T. 8 S

T. 9 S

T. 52 N

T. 51 N

T. 50 N

R.102W R.101W R.100W R.99W

LEGEND

Proposed Pipeline Route

Alternative Route

Existing or Approved Route

10 Milepost

5 0 5

miles

N

Sage Grouse Nesting Area

Map 2. Elk Basin Project.

LEGEND

—— Proposed Pipeline Route

– – – Alternative Route

IIIIIIII Existing or Approved Route

► 10 Milepost

5 0 5

miles

N

Crucial Deer & Antelope Winter Range

Crucial Antelope Winter Range

Crucial Deer Winter Range

Map 3. Elk Basin Trunk Pipeline.

R.91W R.90W R.89W R.88W R.87W R.86W

T. 45 N

T. 44 N

T. 43 N

T. 38 N

T. 37 N

T. 36 N

R.94W R.93W R.92W R.91W R.90W

ELK BASIN TRUNK PIPELINE

LEGEND

Proposed Pipeline Route

Alternative Route

Existing or Approved Route

10 Milepost

5 0 5

miles

N

Crucial Deer and Antelope Winter Range

Crucial Antelope Winter Range

Crucial Deer Winter Range

Map 4. Elk Basin Trunk Pipeline.

R.87W R.86W R.85W R.84W R.83W R.82W R.81W

T. 40 N
T. 39 N
T. 38 N
T. 37 N
T. 34 N
T. 33 N
T. 32 N
T. 31 N

R.90W R.89W R.88W R.87W R.86W R.85W R.84W

ELK BASIN TRUNK PIPELINE

PROPOSED BAIROIL/DAKOTA CO2 PIPELINE

LEGEND

——— Proposed Pipeline Route

— — — Alternative Route

····· Existing or Approved Route

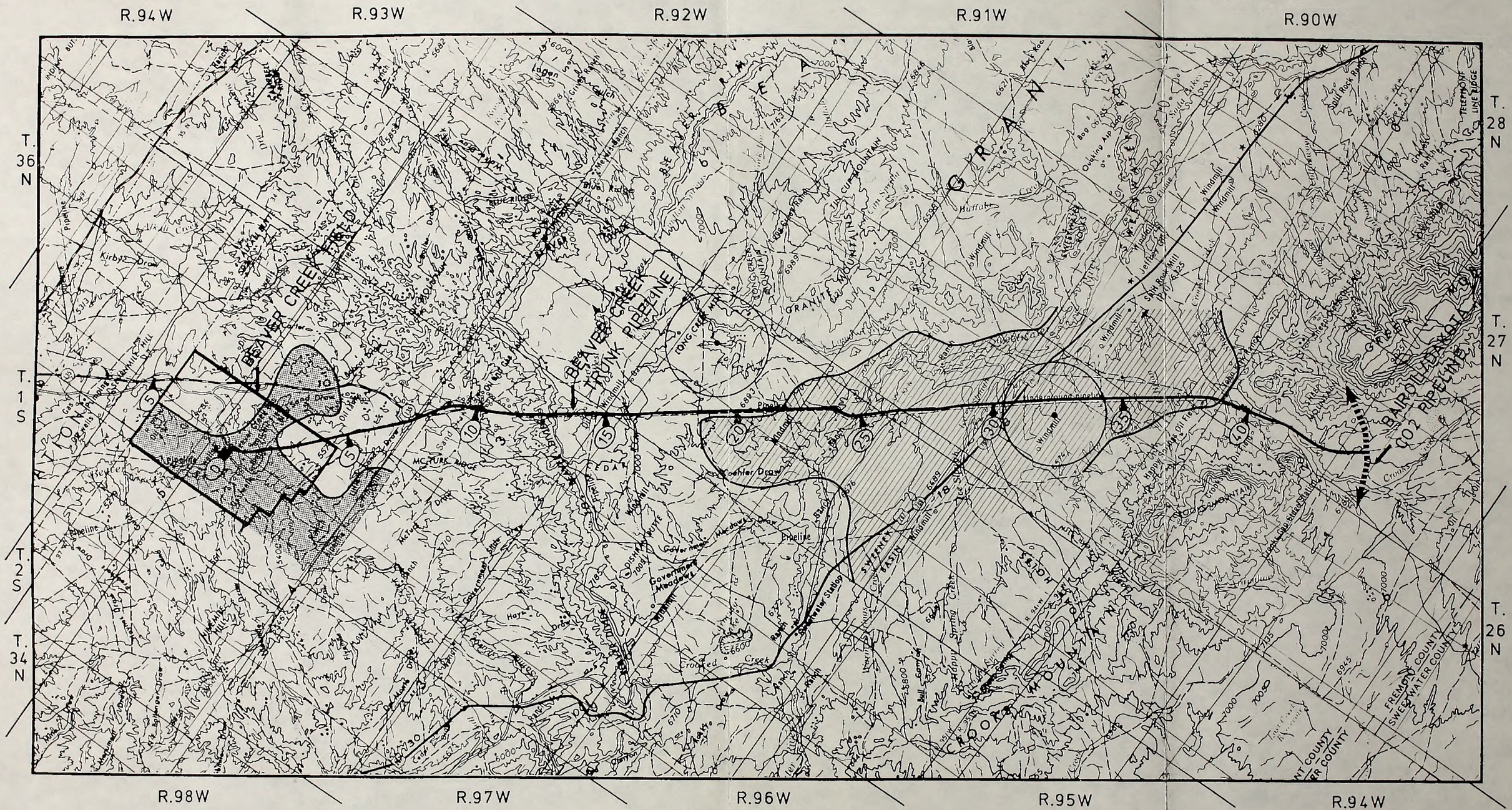
► 10 Milepost

5 0 5
miles

N

Crucial Antelope Winter Range

Map 5. Elk Basin Trunk Pipeline.



LEGEND

Proposed Pipeline Route

Alternative Route

Existing or Approved Route

► 10 Milepost

5 0 5
miles

N

Sage Grouse Nesting Area

Crucial Deer & Antelope Winter Range

Crucial Antelope Winter Range

Map 6. Beaver Creek Project.

R.101W R.100W R.99W R.98W R.97W R.96W R.95W R.94W R.93W

T. 49 N
T. 48 N
T. 47 N
T. 46 N
T. 45 N

LITTLE BUFFALO BASIN FIELD

RIPARIAN EXCLOSURE

ELK BASIN TRUNK PIPELINE

LITTLE BUFFALO BASIN SPUR PIPELINE

BIG HORN COUNTY
WASHAKIE COUNTY
PARK CO.
HOT SPRINGS CO.

LEGEND

- Proposed Pipeline Route
- Alternative Route
- Existing or Approved Route
- 10 Milepost
- 5 0 5 miles
- N
- Sage Grouse Nesting Area
- Crucial Deer & Antelope Winter Range
- Crucial Antelope Winter Range
- Crucial Deer Winter Range

Map 7. Little Buffalo Basin Project.

LEGEND

Proposed Pipeline Route

Alternative Route

Existing or Approved Route

10 Milepost

5 0 5 miles

N

Sage Grouse Nesting Area

Map 8. Salt Creek Project.

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

ER'S CARD
722 1988
urces technical
OFFICE
DATE RETURNED
(Continued on reverse)
TD 195 .P4 L3722 1988
Wildlife resources technical report, 1988
BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

BLM LIBRARY
RS 50A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225